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FLIGHT

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*Editor-in-Chief*
MAURICE A. SMITH D.F.C.

*Editor*
H. F. KING M.B.E.

*Technical Editor*
W. T. GUNSTON

*Production Editor*
ROY CASEY

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# The Hot Breath of Technology

ONE day, perhaps before we are fifteen years older, B.O.A.C. will be operating a supersonic airliner. And one day, perhaps before the end of 1959, the following questions must be answered: Will it be British? How supersonic should it be? What will be the correct time-scale? What about economics?

For two years now an R.A.E./industry committee has pondered these questions —especially the last. Its report and recommendations, prepared by the R.A.E., are now with the Minister of Supply. Because the report is confidential (we trust that the recommendations, at least, will not remain so) the way in which these questions have been answered must remain a matter for speculation. Meanwhile it is timely to consider one possible set of answers.

Britain must build supersonic airliners. About this there is no question: not only because there will always be people willing to pay good money for supersonic travel, but also because the alternative is technical stagnation. As for speed, Britain's lack of high-supersonic experience might suggest a cautious first step—perhaps (for the technical reasons suggested in this journal on February 8, 1957) to Mach 1.9 (1,250 m.p.h.). But the consensus of the most influential American technical opinion is that a Mach 2.5 to 3 airliner could be ready for service by the early 1970s. This means that a British Mach-less-than-two airliner must, if it is to have an economically reasonable obsolescence, be ready by the mid-1960s. In short, a Mach 1.9 airliner, to be worthwhile, must be brought into service (fully developed in non-passenger operations) two years after the VC.10. While this might *just* be technically feasible, it would not make a great deal of economic sense. The alternative is to spend our money—perhaps £150m— on the development of a Mach 3 (2,000 m.p.h.) airliner, to be brought into service seven or eight years after the VC.10.

As for economics, purchase-price and depreciation-life will affect operating cost more than the choice of this or that speed. Purchase price will be immense—greater per unit of work capacity than for any previous airliner—by reason of heavy development costs spread over relatively few production aircraft. Thus, if reasonable operating costs are to be achieved, a long competitive life over which to charge depreciation will be even more important than it is today. The need for long competitive life is something which must be considered most carefully in the selection of design-speed; and so must the strong probability that the airlines will not be ready for another heavy bout of financing for at least ten years. The aircraft industry must be careful lest airlines begin to resent the hot breath of technology down their necks.

Finally, we must not allow ourselves to be docilely brochure-brainwashed into believing that supersonic airliners are a means of bringing down air transport specific costs—this notwithstanding Convair's cool assurance that a Mach 3 transport would have a 12 per cent lower operating cost per seat-mile than a subsonic jet. By this we are not implying that such aircraft will not be economic: there will always be passengers willing to pay handsomely for the facility of flying to, say, New York in a couple of hours.

There will be a demand for supersonic airliners; they will be a business proposition. But Britain must make sure that the necessary immense investment goes into an airliner which has the right speed at the right time.

*"FLIGHT" GOES FLUORESCENT: Though no black-and-white illustration can do justice to the effect, this photograph of our staff Gemini gives a very fair idea of its new colour-scheme (news-item "As Others See Us," below)*

"Flight" photograph

# FROM ALL QUARTERS

## Nuclear Explosions in Space

FOLLOWING a report in the *New York Times* on March 19, the U.S. Department of Defense confirmed that three nuclear devices had been exploded at altitudes of more than 300 miles over the South Atlantic in August and September last year. One object of the test, it was suggested, was to determine whether radio and radar communications could be disturbed by creating artificial radiation at such heights—with obvious applications to the effectiveness of detection systems against missiles and aircraft.

Designated Project Argus, the test programme included the non-military aim of obtaining a fuller knowledge of the Van Allen radiation belts. Observations of the radiation effect of the explosions were made with sounding rockets, and by data telemetered from the Explorer 4 satellite launched on July 26. The three "low-yield" nuclear bombs were launched by means of modified three-stage Lockheed X-17 rocket vehicles (*Fight*, February 6, 1959) on August 27, August 30 and September 6 from *Norton Sound*, a converted seaplane tender.

## Boulton Paul VTOL Work

IT was disclosed last week that Boulton Paul Aircraft are engaged in VTOL research work. A guarded announcement issued on behalf of the firm stated: "It is now known that for some time past Boulton Aircraft Ltd., at Wolverhampton, have been assisting the Ministry of Supply in investigating the possibilities of applying novel forms of direct lift to the vertical take-off and landing of aircraft. During the post-war years the firm has been active . . . in the field of control systems and instrumentation."

## John Lloyd Retires

LAST week Mr. John Lloyd, F.R.Ae.S., of Sir W. G. Armstrong Whitworth Aircraft Ltd., announced his retirement. His decision terminates a long and distinguished career in aircraft design, culminating in his appointment as A.W.A. technical director in 1948. He relinquished that title in 1955 but remained on the Board, from which he has just resigned.

*Mr. Lloyd*

Mr. Lloyd (born in 1888) was among the first technicians at the R.A.E., Farnborough, and at the age of 26 was already head of the stress section. But in 1917 he left to join the Siddeley Deasy Co. of Coventry, as assistant chief designer; and in 1923 his long association with Sir W. G. Armstrong Whitworth Aircraft Ltd. began when on the company's formation he was appointed chief designer.

Mr. Lloyd was responsible for the design of some of Britain's most successful aircraft of the inter-war years, including the metal Siskin; the Atlas; and the Argosy (from which the new AW.650 inherits its name—see reminiscent picture, *Flight*, October 17 last year), Atalanta and Ensign of Imperial Airways fame.

At the outbreak of the last war he was working on the Whitley, which gave good service in the R.A.F.; and after the war he designed the experimental A.W.52 Flying Wing—produced first as a glider and then as a twin-jet aircraft, yielding much valuable data on laminar flow—and was also responsible for the Apollo.

*SOCIETY OCCASION: Seen at the recent Louis Blériot lecture in London—Dr. A. M. Ballantyne (left), secretary of the Royal Aeronautical Society, in conversation with M. Jarry, president of A.F.I.T.A. (the Society's French equivalent) and Mme. Jarry. At far right is Gen. Noël Daum, technical director of Nord-Aviation, delivering his lecture on turbo-ramjets; the paper was summarized in "Flight" last week*

## Turboprop Co-operation

AN announcement made after a recent meeting between officials of Rolls-Royce Ltd. and the Westinghouse Electric Corporation said that detailed plans were discussed for the joint development of a military turboprop engine. The programme would make use of Rolls-Royce design experience in this field and of Westinghouse's gas turbine production experience.

## New C.A.S.

IT is announced as we go to press that Marshal of the R.A.F. Sir Dermot Boyle is to finish his tour of duty as Chief of the Air Staff at the end of this year. He will be succeeded on January 1 by Air Chief Marshal Sir Thomas Pike, at present A.O.C-in-C. Fighter Command. Sir Dermot, who is 54, has been C.A.S. since January 1, 1956, when he succeeded Marshal of the R.A.F. Sir William Dickson. His successor as C.A.S. has been A.O.C-in-C. Fighter Command since August 1956. Sir Thomas Pike, who is 52, will be succeeded in that post by A.V-M. H. D. McGregor, with the acting rank of air marshal.

## As Others See Us

BELIEVING as it does in the use of aids conducive to air safety, *Flight* recently had its Miles Gemini G-AKHC painted on prominent surfaces with Day-Glo orange fluorescent paint, as shown in the picture above. There were notable precedents, for the M.T.C.A. recently decided to use Day-Glo on their fleet of 15 small aircraft (see *Flight* for February 20); the paint is used in the U.S. by both civil and U.S.A.F. machines; and the Comet 1 operated by D.H. Propellers Ltd. for test-flying has worn this fluorescent livery for about a year. There are several other users in this country, but this is believed to be the first British private aircraft to wear anti-collision paint.

The Gemini had a first outing in its new colours on March 10, when it went to R.A.F. Tangmere on a hazy afternoon and was reported to be exceptionally visible in a circuit normally inhabited by Canberras and Varsities; then on March 16 its appearance over Shrewsbury drew the following unsolicited testimonial from a *Flight* reader, Mr. R. D. Breslain, who writes:

"*Flight's* Gemini, G-AKHC, in its new livery did a couple of circuits over Shrewsbury. Conditions were hazy and it was amazing how the red on cowlings and wing leading-edges caught the eye and enabled the aircraft to be spotted at a greater distance than other aircraft flying at approximately the same height. Going away at an angle of 45 deg the fins were seen with the naked eye long after the rest of the aircraft had disappeared in the haze.

"I might add that I am a member of the Royal Observer Corps and had been spotting aircraft for about an hour when the Gemini came over. Hence the comparison of it being visible at greater distances."

"Flight" photographs

*SCHOOLMASTER AT ARMS: The first Hunting Jet Provost T.3 for the Royal Ceylon Air Force, carrying concrete-headed rockets for air firing trials from Boscombe Down. A machine gun is fitted in the base of each air intake*

## European Air Tour

THE national aero clubs of five European countries are co-operating in the organization of a light-aircraft tour to be held under F.A.I. auspices during June. The tour will start at Rotterdam on June 17, continue through Belgium to Vittel in France on the 18th, stop at Coblenz on the following day, and will conclude in Luxembourg where the national aero club is celebrating its 50th anniversary.

The F.A.I. hopes that this tour will become an annual event on the sporting aviation calender and that, following the success of a number of limited tours, it may be possible to hold an all-Europe tour similar to those held in pre-war years. Enquiries from British pilots wishing to participate should be addressed to the Royal Aero Club.

## Succeeding Sir Roy

AN important appointment announced as we go to press is that of Mr. J. A. R. Kay as managing director of A. V. Roe & Co. Ltd. Mr. Kay, who is 44 and a former Avro apprentice, became joint managing director of Hawker Siddeley Aviation Ltd. last January. His appointment follows the decision of Sir Roy Dobson to relinquish the post in order to concentrate more fully upon the activities of the Hawker Siddeley Group, of which he is managing director. The appointment is also announced of Mr. S. G. Joy, company secretary, as Avro director and general manager.

*VISITING THE THUNDERBIRD at English Electric Aviation's Guided Weapons Division on March 13 was the Minister of Defence, Mr. Duncan Sandys (centre). Mr. Sandys is seen with (left) Sir Conrad Collier, chief executive of the Guided Weapons Division, and (right) Mr. A. T. Slator, divisional manager*

## Napier Executive Changes

SEVERAL executive changes have been announced by D. Napier and Son Ltd. (as briefly recorded in a news-item last week) following the recent amalgamation of the company's Aero Gas Turbine Division, the Research Station at Liverpool, the Piston Engine Division and the Research Department, Acton, into one technical organization under Mr. A. J. Penn as technical director. The changes are as follows:—

Mr. R. H. Chamberlin, formerly chief designer of the Aero Gas Turbine Division, has been appointed chief engineer; Mr. L. F. Hall, formerly chief research engineer, is now chief research and special projects engineer; Rear Admiral W. G. Cowland, formerly deputy chief engineer (turbo-blowers), is now marine assistant to the technical director; and Mr. S. Wernicki is administrative assistant to the technical director.

Mr. R. A. Gilbert is now the chief designer, Mr. D. P. Ferguson the assistant chief engineer (Aero) and Mr. C. D. Carmichael the assistant chief engineer (Deltic and turbo-blowers). Mr. J. S. Clough, formerly chief development engineer of the Aero Gas Turbine Division, has been made engine test manager and Mr. M. E. Clarke the manager of the London Research Department. Mr. D. C. Broadbent is assistant chief designer (Aero) and Mr. L. H. Elford assistant chief designer (turbo-blowers). Mr. F. R. Heath becomes chief development engineer (Aero) and Mr. G. E. Clifford chief development engineer (turbo-blowers).

The following appointments remain unchanged: Dr. A. W. Morley as forward projects engineer; Mr. J. K. Wilson, chief metallurgist; Mr. B. T. Bayne, chief performance engineer; Mr. W. G. Mead, chief draughtsman; Mr. P. J. Wallace, chief test plant engineer; Mr. L. A. Nevard, manager, Research Station, Liverpool; Mr. G. H. Murray, assistant chief designer (Deltic), and Mr. H. W. Gibbs, chief development engineer (Deltic).

# IN BRIEF

The international 100 km closed-circuit speed record for convertiplanes of 307.22 km per hour (190.9 m.p.h.) set up by S/L. W. R. Gellatly in the Fairey Rotodyne on January 5 has been confirmed by the F.A.I.

* * *

Israeli Air Force pilots are being sent to Ghana to help to establish the first flying training school there.

* * *

It is reported that the Indonesian Air Force is to receive ten B-25 Mitchells and ten F-51 Mustangs from the United States. It already operates B-25s and F-51s of the former Dutch East Indies Air Force.

* * *

*Lt-Cdr. J. R. S. Overbury, who (as briefly recorded last week) has joined Hunting Aircraft Ltd. as a test pilot. Formerly chief test pilot of Saunders-Roe Ltd., he carried out SR.53 prototype trials. He was awarded the de Havilland Trophy for 1954 in recognition of his point-to-point London-Amsterdam record (at 571.5 m.p.h.) in a Sea Hawk; and he set up a Rome to Malta record in 1955 in a Sea Venom at a speed of 538 m.p.h.*

* * *

Donald Campbell is to use the 2,725 yd long runway at Filton (built for the Brabazon) for tests of *Bluebird*, the car fitted with a Bristol Proteus engine in which he hopes next year to set up a new world speed record of more than 400 m.p.h.

* * *

Owing to increasing demands upon its services, the National Aeronautical Establishment in Canada has been separated administratively from the mechanical engineering division of the National Research Council. From the beginning of this year it has functioned as a new division, with facilities at Uplands Airport and the N.R.C. laboratories, Ottawa (referred to in *Flight* for August 24, 1956). The acting director is Mr. Frank R. Thurston.

*NAPIER executives with new posts, following the changes described in an item on this page, include (top row) Mr. R. H. Chamberlin and Mr. L. F. Hall and (bottom row) Messrs. R. A. Gilbert, D. P. Ferguson and M. E. Clarke*

# POWER AND FREQUENCY

## *Some Fresh Thoughts About the Comet 4*

By J. M. RAMSDEN

IN retrospect, 70-odd hours spent in a B.O.A.C. Comet 4 flying 28,000 miles down B.O.A.C.'s eastern routes and back* leave two outstanding impressions. These can be summed up in the words power and frequency.

Many other impressions crowd and jumble the memory. The passenger-address system was unintelligible to most passengers. The air conditioning was good, but temperature distribution was uneven: the floor grilles would be cool when the recirculation ducts in the cabin ceiling were warm. The inboard engine blow-off valves, in use during the last half-hour or so of each flight, were noisy. These relatively small matters of engineering, all of them to do with passenger well-being, need—and are in fact getting—attention, because the Comet 4 is an airliner whose passengers expect (and with these exceptions get) a superlatively high standard of comfort.

With power and frequency most passengers are less consciously concerned. The power is certainly felt, and the take-off and climb-away are exhilaratingly unlike anything that new Comet 4 travellers have experienced before. In what other airliner can you look down from 1,000ft on the terminal building you left a few minutes ago—before you have passed the end of the runway? We did this at Rangoon and at Manila and at other places on days when temperatures were up in the eighties.

How does an airliner impress a passenger with its frequency? It does not, of course—except inasmuch as the passenger probably wouldn't be sitting in it if frequency had been lacking. He goes by the most comfortable service which leaves (and gets him where he wants to go) at the time which suits him best. *Any* airliner is able to offer frequency, provided it is the right size for the available traffic. This is a nice matter of economic judgment, and there is no doubt whatsoever that the Comet 4 is the right size for most of B.O.A.C.'s routes, with the exception of the North Atlantic, for which a bigger airliner is desirable.

The relationship of the Comet's medium size (60-80 seats) to the traffic on the eastern routes was discussed in a previous article. Here, more fully to illustrate the points then made, are the increased number of services per week which B.O.A.C. are planning to offer through typical points:—

| Point | Present number of services per week | Planned number of Comet 4 services per week |
|---|---|---|
| London ... ... ... | 7 | 10 |
| Frankfurt ... ... ... | 2 | 3 |
| Zurich ... ... ... | 1 | 3 |
| Rome ... ... ... | 2 | 3 |
| Beirut ... ... ... | 5 | 9 |
| Karachi ... ... ... | 4 | 5 |
| Rangoon ... ... ... | 2 | 3 |
| Bangkok ... ... ... | 2 | 3 |
| Hongkong ... ... ... | 5 | 8 |
| Tokyo ... ... ... | 3 | 4 |

Thus is improved frequency of service being offered on routes which need it, virtually right from the start of B.O.A.C. Comet 4 operations on the eastern routes. Those points not listed retain, for the time being, existing frequencies.

It is on this count—size—that the Comet 4 will undoubtedly score over its biggest jet rivals, at least on routes other than the Atlantic. An aircraft of the same capacity as the type which it replaces can double frequency to handle double the traffic. But an airliner which is *double* the capacity of existing types may actually have to reduce frequencies in order to achieve profitable loads. The day will come when the eastern routes, and others comparable, need airliners of 707 and DC-8 size. The day has already arrived when these routes need improved frequency of service, and the Comet 4 will be able to fulfil that need for some time to come.

It has been argued that the Comet 4, being roughly 50 m.p.h. slower in block speed than its larger American rivals, will put its operators at a disadvantage. The sanity of speed-competition for its own sake was well challenged by the remark of a young Indian B.O.A.C. traffic officer in Calcutta, who said: "No one ever rushes into my office saying: 'I want to get to Tokyo as fast as possible.' He just wants a flight that gets there on a certain day at a certain time . . ."

In other words, the airliner that sells best to passengers is not only the one with the power, but the one with the frequency-potential of medium size.

Power is an asset which the Comet enjoys in a measure unmatched by any other airliner and, in particular, by any other jet airliner. Here are some typical thrust:weight ratios:—

| Aircraft | Engine | Max. thrust all engines (lb) | Gross Weight (lb) | Ratio |
|---|---|---|---|---|
| Comet 4 ... ... | RA.29/1 | 42,000 | 158,000 | 0.266 |
| Convair 880 ... ... | J79 | 44,800 | 184,500 | 0.242 |
| Caravelle ... ... | RA.29/3 | 23,400 | 99,000 | 0.236 |
| DC-8 Intercontinental | R.Co.12 | 72,000 | 310,000 | 0.232 |
| 707-120 ... ... | J57(wet) | 52,000 | 247,000 | 0.210 |
| 707-320 ... ... | J75 | 62,000 | 295,000 | 0.210 |

For cruising, the Comet 4 can use up to the Rolls-Royce "maximum recommended" figure of 7,350 r.p.m. In practice this figure is rarely used; even on the eastern routes 7,350 r.p.m. is not required except in the hottest conditions—i.e., I.S.A. +24 deg C and above.

This means (1) that the Avon RA.29 spends a large proportion of its life running relatively relaxed, which probably helps to explain—as we have noted before—the long strides in RA.29 overhaul life; and (2) that the Comet 4 is virtually insensitive to temperature so far as flight-plan cruising-height selection is concerned. The Comet 4's ability to cruise along an optimum "profile" tends to be taken for granted; it is made possible by the Comet's plentiful power. This was emphasized by a recent report in *Aviation Week*, which said of PanAm's 707-120: "If the temperature at 33,000ft is −40 deg C . . . the jet can get only to 27,000ft after a full gross take-off . . ." Only if temperatures were down to −50 deg C, added the report, could the aircraft start to cruise-climb at 33,000ft.

Our experience of Comet 4 flight-planning along the eastern routes—where take-off temperatures average 15-20 deg C higher than those over the North Atlantic—was that the aircraft can take off at its maximum weight of 158,000 lb and can then select any initial cruising height up to about 35,000ft *irrespective of temperature*, climb-cruising or step-climb-cruising from that height as fuel is burnt off. The importance of freedom of height-selection to a jet airliner needs no emphasis.

It will be extremely interesting to see, in a few months' time, how the B.O.A.C. Comet 4 and the Qantas 707-120 match up on the eastern routes between the U.K. and the Far East and Australia. Qantas hope to inaugurate services on these routes in September. Will Qantas' choice of 707-120 (an order which was a controversial Australian political issue when it was placed) prove justified when the aircraft is matched against a jet of the Comet's "fillable" size and excellent temperature performance?

All that can be said now is that the B.O.A.C. Comets have not been limited as regards runway length or cruising-height-selection on the North Atlantic route; nor—and this is the significant point—will they be limited in these respects in the hot atmosphere of the temperate/tropical routes to the East. The 707-120 will see the Comet 4 off handsomely so far as seating capacity is concerned on both the North Atlantic and the eastern routes: but whether

(*Concluded on page 422*)

**"Eastern Routes Jet," "Flight," February 6 and 13, 1959.*

*"In what other airliner can you look down from 1,000ft on the terminal building you left a few minutes ago—before you have passed the end of the runway?" The Comet 4 taking off at full weight*

# "The High Endeavour of a Splendid Man"

FRANK BARNWELL — AS REMEMBERED By C. F. UWINS

*The lecturer and—a picture from his personal album—his subject in 1917*

THE last of Frank Barnwell's aircraft designs—there were over 150 in all—was a private monoplane built at Whitchurch Aerodrome. There, in 1938, this small machine spun in from a stall and he was killed instantly. So, tragically, ended the life of a splendid man and engineer who had served the Bristol Aeroplane Company for 25 years. Particularly in the Bristol Fighter of 1916 and the Blenheim of 1936, Barnwell was of great service to his country. Earlier, as a pilot (from 1908), he had been a captain in the Royal Flying Corps and then a major in the Royal Australian Air Force.

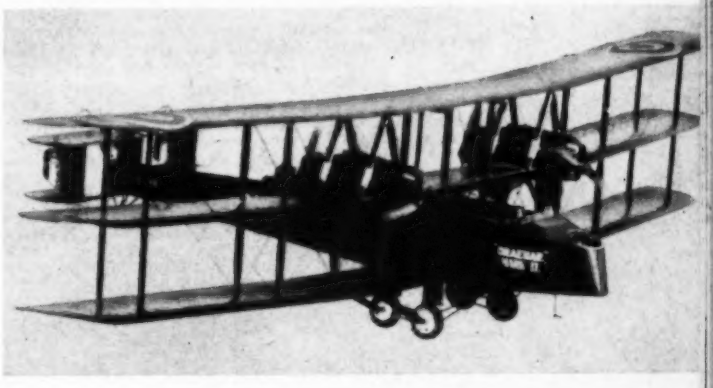
Each year his memory is honoured by the Bristol Branch of the Royal Aeronautical Society, and, as we briefly noted last week, March 11 was the occasion of the sixth Barnwell Memorial Lecture. It was a notable occasion, for the Society also did honour to the lecturer, the pilot who made the first flights of all Barnwell's designs from 1918 onwards, and who was chief test pilot of the Bristol Aeroplane Company for very nearly 30 years. Mr. Cyril F. Uwins, O.B.E., A.F.C., F.R.Ae.S., now deputy chairman of the company, was described by Mr. Peter Masefield, the Branch chairman, as a man who had a unique place in aeronautical history, a man who had tested no fewer than 54 prototypes, and who had over 120 different aircraft in his log-book. His record of unbroken flying as chief test pilot for one company was probably unparalleled. In 1932 Cyril Uwins had gained the world's height record in the Vicker's Vespa with a Bristol Pegasus engine, and the height of 44,000ft was still a record for an aircraft with an open cockpit. In that year Britain had held the world "triple" of height, speed and distance and had also held the land speed record—truly the days of high endeavour. The lecturer had been awarded the Britannia Trophy and was the first recipient of the R.Ae.S. Silver Medal for Aeronautics.

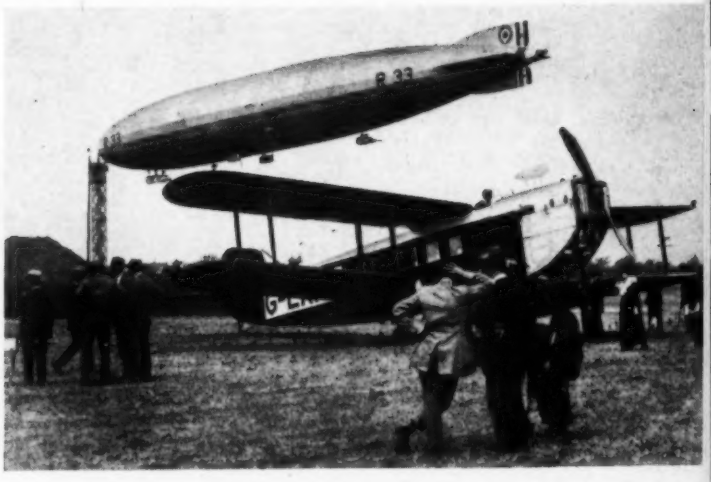
Mr. Masefield also noted an early achievement by Cyril Uwins: with Lt-Col. Sholto Douglas (now Lord Douglas of Kirtleside), he had made the first commercial flights after 1918. Sholto Douglas had flown from Cricklewood to Manchester and Uwins from Filton to Hounslow.

Mr. Uwins's lecture was on *Bristol Prototypes*, and as well as being a personal history of wonderful (and sometimes frightening) times and machines, was also a brief history of the long span of Barnwell designs—plus some of Reid's, from 1918-23, when Barnwell was in Australia. The lecturer recalled his first associations with Bristol and also with Lord Douglas, for both had served at Netheravon and flown the famous little Scout F, which was the first of Barnwell's Bristol designs.

In the audience was L. G. Frise, now of Blackburn and General Aircraft, who was with Barnwell for many years and succeeded him on his death, and whose name is associated with the universally used Frise aileron. Another was Clifford Tinson, who joined Barnwell as his draughtsman in 1911 (in a cottage at Filton dramatically known as "Department X") and started work on the "Burney Boat" hydroplane. Mr. Tinson later became chief draughtsman to Barnwell; he retired from Bristol in 1956. Another of long association was Fred Mayer; and there was also T. W. Campbell, who flew with Uwins until taking over the Bristol Flying School.

In his lecture Mr. Uwins showed slides illustrating aircraft from the Boxkite of 1910 to the Blenheim of 1936, and even 1½ hours did not permit the showing of all the Barnwell types. But each of these machines was an endeavour to be the greatest possible advance on its predecessor, and Barnwell was certainly triumphant in the *Britain First* (forerunner of the Blenheim) which





*(Upper right) Originally intended to bomb Berlin—the Mk 2 version of the four-engined Bristol Braemar triplane bomber. (Right) The Bristol Ten-Seater, powered with a Napier Lion, seen in company with the R.33 at Croydon. (Below) A floatplane touring version of the Bristol Fighter which, when the engine stopped, "floated away to sea"*

*The Jupiter-engined racer of 1923. Wing flexing caused Capt. Uwins some embarrassment on the first flight*

## "The High Endeavour of a Splendid Man . . ."

was 100 m.p.h. faster than the R.A.F. fighters then in service. Not all the machines were successful; some involved trepid experiences in piloting—but so much had depended on the engines, not all of which had been Bristol! Many of the aircraft were advanced designs, ahead of their time; and if only money and time had been available, so much more could have been achieved from so many prototypes. Prejudice had also to be expected; and among other instances the lecturer quoted the M.1C monoplane, which was a splendid machine not deserving the fate of an adverse report by a Service pilot who had just crashed it in France. The type did excellent work in the Middle East.

The lecture contained many instances of the hazards of test flying in the days when the test-rig had yet to become fashionable; in those days the test-rig was the real thing—the aeroplane, and this fact led to many spectacular, if unnerving, take-offs and landings. As Dr. A. E. Russell, Bristol chief engineer, said in his vote of thanks, the most surprising thing of the evening was not the remarkable chronicle, the gathering of old associates, or the romance of a formative era, but simply the fact that Cyril Uwins was there at all!

Mr. Uwins spoke from the slides with only a few notes, but this history of famous machines by a famous man is now on magnetic tape for future record. Also for the record is that this is the thirtieth anniversary year of the Bristol Branch of the Society, and that one of the first lectures to the newly formed Branch, in 1929, was by C. F. Uwins on the subject of *Experimental Test Flying*. He had concluded that lecture by saying:—

". . . the whole secret of efficient test work must lie in efficient co-operation between the pilot and designer. The designer must have faith in the pilot's ability to locate faults, and the pilot must believe in the designer's ability to produce good aeroplanes and engines. It is a pleasure to be able to say that the disappointments the pilot occasionally suffered some years ago in this respect are now becoming more and more a thing of the past."

The sixth Barnwell Memorial Lecture referred again to this relationship of a chief test pilot, and, as the lecturer said, of "the high endeavour of a splendid man."

* * *

At a dinner which followed the lecture those present included (with others already mentioned) Sir Reginald Verdon-Smith, Rear Admiral Sir Matthew Slattery, Sir Alfred Pugsley, Mr. Stuart Scott-Hall, A. Cdre. F. R. Banks and Professor A. R. Collar (chairman of the Branch). Among Bristol test pilots (former and present) were Walter Gibb, Godfrey Auty, Ronnie Ellison and C. T. (Sy) Holmes; the last-named, in 1923, gave flying instruction to another famous test pilot present—Harald Penrose of Westland.

## POWER AND FREQUENCY (continued from page 420)

this capacity (assuming that it is filled) can be unrestrictedly exploited on the eastern routes remains to be seen.

The 707-320 Intercontinental will, of course, be more plentifully powered than the -120, but its thrust: weight ratio is no greater, and because its J75s will be dry, it will be no less sensitive to the runway temperature problems discussed above. However, having no water injection—thereby bringing cruise thrust closer to the take-off thrust than in the J57 version—and having a greater basic range anyway, the -320 is not likely to run into the problems which, according to the American report, were encountered by the -120 on the North Atlantic route:—

"PanAm pilots have occasionally run into unexpected trouble . . . where temperatures do not continue to fall as altitude is increased. Thus a pilot, climbing to the next step of altitude and expecting a power-speed-weight condition based on a lower temperature, finds he cannot maintain the new altitude and has to go back down again or use an undue amount of fuel."

But if the avoidance of such difficulties is true of the -320, it should be true also of the Comet 4, whose thrust: weight ratio is 27 per cent greater than that of the -120.

Power is an asset which manifests itself not only in the freedom to use gross weight for take-off and to cruise at the optimum height: it means, to give a few examples, freedom from messing about with the complexity and cost of water injection (the water alone in the Boeing 707-120 weighs 7,000 lb); the ability to climb steeply away over noise-conscious communities (the Comet 4 has a second-segment gross climb gradient in standard conditions on three engines of more than 7½ per cent—4½ percentage points more than airworthiness requirements call for); and freedom to use full engine de-icing on a cold day on the ground without dropping one pound of weight (the -120 drops 8,000 lb in such conditions). A big reserve of power such as the Comet 4 possesses may cost money, in terms of weight and fuel consumption, but it can also save money, and pay for itself, in the adverse realities of day-to-day operation. At any rate, there seems to be no one in B.O.A.C. with any doubts that they have the right aircraft for the job.

For the future, there are many questions that spring to mind. The Comet 4 has much development potential left, and further increases in range would make it more attractive to operators having long and difficult sectors. It is known that the Stage 6 version of the RA.29 engine will give 12,000 lb of thrust compared with 10,500 lb of the Stage 1, *and* improved specific consumption. Many long-range routes such as the North Atlantic do not demand the present excellent aerodrome performance of the Comet 4. So on both counts perhaps a substantial increase in all-up weight is called for. But what of the tankage that would be required to go with it? Could the pod tanks be enlarged? These and other developments must be very much in the minds of de Havilland's designers. A Comet 5 has been hinted at in the daily Press; and it will be interesting to see the way in which de Havilland exploit the potentialities of their jet airliner.

## AGRICULTURAL AUSTER'S PERFORMANCE

DATA for the Auster Workmaster, published recently by the makers, includes: performance at maximum gross weight of 2,650 lb with spraying equipment fitted: maximum speed at 1,000ft, 106 m.p.h.; maximum cruise speed at 1,000ft, 90 m.p.h.; zero-wind take-off run, 220 yd; flaps-down stalling speed, 36 m.p.h.; initial rate of climb (flaps up), 360ft/min, (take-off flap), 590ft/min; distance to 50ft, 485 yd. Powered by a 180 h.p. Lycoming O-360 engine, the Workmaster has a wing loading at maximum gross weight of 14.3 lb/sq ft, a power loading of 14.7 lb/h.p., and a spray-tank capacity of 100 Imp. gal. The recommended speed for spraying is 60-80 m.p.h.

## RETROSPECT

***From "Flight" of March 27, 1909***

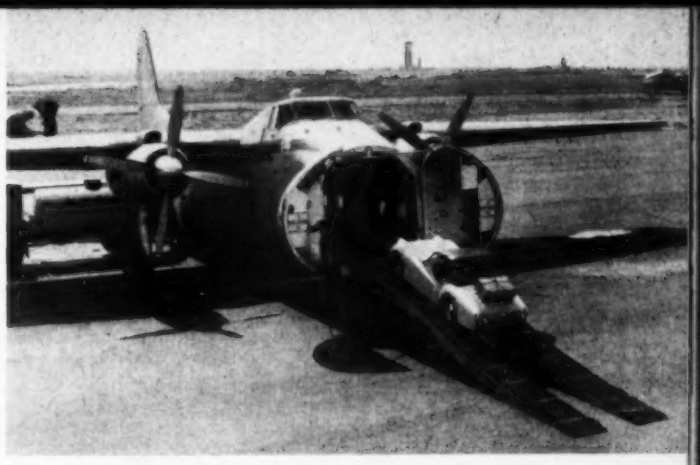
*The "Bank" and Airships:* At the meeting of the proprietors of the Bank of England, on Thursday of last week, a query was anxiously addressed to the chairman as to the vulnerability of the "old lady of Threadneedle Street" should an airship hover above the Bank of England, and, by way of announcing its presence, drop a projectile or two. Would the vaults holding the bullion be sufficiently strong to withstand such attentions? The question proved too much for the chairman, who was unable to answer, as he confessed he was ignorant of the risk.

An "expert" has since come to the rescue, however, and shown that the gold reserve of £40,000,000 would prove a somewhat awkward bundle of "swag" to fly away with. The weight of this amount of gold would be somewhere about 320 tons, and he estimates that it would require a fleet of 1,000 huge dirigibles, each capable of carrying 1,000 pounds weight, and assuming each dirigible cost £5,000, the capital involved in the predatory expedition would be about five million pounds. Further, according to the expert, if aeroplanes were used, 4,000 would be required, as they cannot carry much more than 250 lb, and such a huge fleet, he incidentally suggests, might find difficulty in obtaining garage accommodation just now.

# CHANNEL AIR FERRIES

## *Room for One More?*

By A. T. PUGH



***The doors of Silver City's Bristol Freighter are wide open to take this Triumph T.R.2, but the driver may have had to book months earlier***

EACH year the number of British holidaymakers who travel to the Continent increases; so, too, does the number of those who take their cars with them. Services for carrying cars on the short sea crossing between the coast of England and the westerly shores of France, Belgium and Holland are well established and the broad patterns of the traffic, with its sharply seasonal ups and downs, can easily be discerned.

A closer investigation of the broader pattern of cross-Channel flow suggests that, as might be expected, the number of first-time travellers to the Continent has dwindled in the 13 years since 1946, albeit the total numbers of first-timers is still surprisingly high. But the leeway of six wartime years has been made up and more of those who pass through the Channel ports and air ferry airports have made the journey before.

Observation shows that a first experience of Continental travel may change a holidaymaker's outlook and his travelling habits. On a return visit to the Continent, when the sheer novelty of being abroad is superseded by the discrimination resulting from past experience, the need for greater mobility becomes paramount. Cars can certainly be hired abroad (B.E.A., for instance, operate a scheme that provides a rented car at the airport) but in general it is cheaper—and more reassuring—for a family to travel in their own car. Such families provide the majority of the business for which the cross-Channel ferries cater. The remainder consists of (a) a nucleus of business traffic less subject to the wide seasonal variations of the holidaymaker, but which nevertheless increases in volume during the summer months, and (b) freight.

The demand for cross-Channel car travel has consequently risen steadily in recent years, and it has been accelerated by fares reductions, by the abolition of some of the intimidating documents that had to be carried (notably the carnet, the triptyque and international driving licence) and by the provision of alternative methods of travel and points of departure. The air ferries, by easing the difficulties of taking a car abroad, and by providing terminals geared to handle vehicles and passengers in a steady flow, have profited from an increasing share of the total business. In 1956, 232,100 cars were carried across the shorter routes to the Continent, about 36,800 of them by air. In 1957, 40,300 of the 242,800 cars crossing the Channel (16.6 per cent) were carried by the air ferries. Last year the proportion swung further in favour of air transport: out of a greater total number of cars than ever before (305,000) 58,800 were carried by the two cross-Channel car-ferry operators Silver City and Air Charter.

Although, in general, fares on the sea crossings are less than for the equivalent journey by air, in some cases parity has been reached. Journey distances are not great (Dover to Calais is 21 miles, to Boulogne 26, Southend to Calais - Marck Airport 78 and Ferryfield to Le Touquet 42) and the off-peak air fare per mile is moderate; on Silver City's Ferryfield - Calais route 2s 10d per mile for a car 13ft long and 1s 5d per mile for each passenger. Air Charter's fares at 1s 8d per mile for a car and 1s per mile for each passenger on their longer route from Southend to Calais are competitive. In comparison, the sea fare for a car of this length is about 4s 6d per mile between Dover and Calais, although the actual fare is less than the lowest air fare on this very short sea crossing. The modest difference in fare between sea and rail is offset by the greatly reduced journey time offered by air travel, an advantage that the two airlines concerned have been quick to exploit by reducing to the minimum the time required for processing and loading at the terminal airports. The success of their policies is evidenced by their rapid expansion over the past few years, as the table shows. The chief credit must go to Silver City, who pioneered the cross-Channel air ferry and have greatly increased the volume of their business by reductions in fares. The airline's fares policy has frequently been extolled as the classic vindication of a low-fare policy.

| Calendar Year | | (1) Air Charter | (2) Silver City | (3) Ships | (4) Total |
|---|---|---|---|---|---|
| Accompanied cars carried | 1956 | 8,500 | 28,325 | 195,300 | 232,100 |
| | 1957 | 11,200 | 29,116 | 202,500 | 242,800 |
| | 1958 | 13,000 | 45,808 | 246,240 | 305,000 |
| Annual increase (per cent) | 1956 | — | — | — | — |
| | 1957 | 31.8 | 2.8 | 3.7 | 4.6 |
| | 1958 | 16.0 | 57.2 | 21.6 | 23.8 |
| Proportion of totals (per cent) | 1956 | 3.7 | 12.3 | 84.0 | 100 |
| | 1957 | 4.6 | 12.0 | 83.4 | 100 |
| | 1958 | 4.3 | 15.2 | 80.5 | 100 |

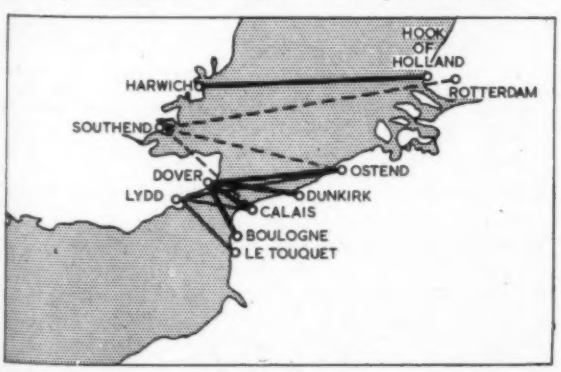
(1) Southend-Calais, Ostend, Rotterdam. (2) Ferryfield - Le Touquet, Calais, Ostend. (3) Dover and Folkestone - Calais, Boulogne, Dunkirk, Ostend. Harwich - Hook of Holland. (4) Totals in round figures.

It can be judged that the Air Ferry (Silver City) and Air Bridge (Air Charter) are providing a good public service, an attractive fare and frequent schedules. But so successful have successive fare reductions been that during the height of the summer season the bookings for a particular flight—or even for a particular morning or afternoon of a particular weekend—achieve a scarcity value early in the year. (As a corollary, when fares were raised, the number of early bookings fell.) In spite of intensive and protracted efforts on the airlines' part, the seasonal peak is still very sharply defined, and the demand for space in August may rise by 1,000 per cent over the troughs of December or January.

Both airlines tackle the problem of peak periods by the usual devices for regulating supply and demand, and they charge fares that on certain specific days during the summer period of June 1 to September 30 are approximately 30 per cent higher than the standard rate for this season. Winter fares may be set at a discount on the basic rates. A measure of the problem of "peak" seasonal demand (reaching its maximum over August Bank Holiday but adversely affected also by the start of school holidays and Wakes weeks) is that increased fares are not a complete deterrent to heavy bookings for flights over these periods. Some travellers are turned away or at best have to accept alternative times.

Clearly, no commercial enterprise is content to reject business or see it pass to a competitor, but with such a highly seasonal occupation as ferrying accompanied cars across the Channel it would equally not be good business if substantial excess capacity was available at times of peak demand. In fact, both carriers apply higher fares on only 20 days out of the whole year; infrequently enough it would seem, until it is remembered that these days represent the Fridays, Saturdays and Sundays of every weekend between mid-July and mid-September—each one of them traditional travelling days for British holidaymakers stretching ten working days' holiday to sixteen days away. [*Contd. overleaf*

***Short routes to the Continent on which cars can be carried. Sea ferries are shown by heavy lines, Silver City's routes from Lydd (Ferryfield) by thin lines and Air Charter's routes by dotted lines***



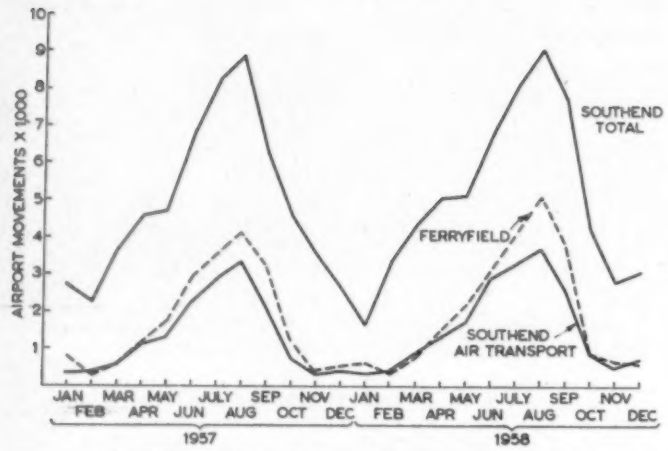

AIRPORT MOVEMENTS X 1000
SOUTHEND TOTAL
FERRYFIELD
SOUTHEND AIR TRANSPORT
JAN MAR MAY JULY SEP NOV JAN MAR MAY JULY SEP NOV
FEB APR JUN AUG OCT DEC FEB APR JUN AUG OCT DEC
1957
1958

*Fig. 1. Passenger handling capacity rather than runway movements will limit air ferry traffic at Ferryfield and Southend. Club flying accounts for the non-commercial operations at the latter airport*

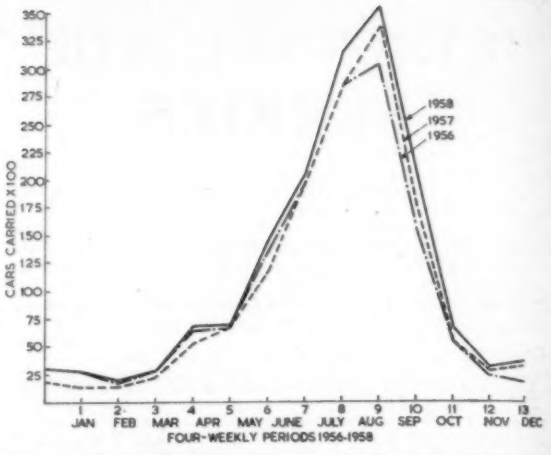



*Fig. 4. Sharp seasonal fluctuations in traffic are not endemic to the air ferries. These curves show the variations experienced by the jointly operated British Railways and S.N.C.F. ferry*

## CHANNEL AIR FERRIES . . .

What is the ultimate limit to which the air ferries' capacity can be stretched? And what establishes the limit? Silver City, who estimate that they carry 16 per cent of their year's total car traffic on the 20 peak days of the year and three-fifths of the total between June and September, have operated from Ferryfield as many as 250 ferry services in a long summer's day. Although on these occasions the numbers of passengers handled (passenger services also operate from Ferryfield but are being moved progressively to Manston, in Kent) is very large and passenger processing channels are extremely hard-worked, the limitation on the number of bookings that can be taken is not yet passenger or car handling capacity, the capacity of the fleet of Bristol 170s, the number of movements on the runway, or the hours of daylight (limited operations continue after dark).

In practice, the number of cars that can be carried is restricted by staff available to handle car and passenger traffic. Although seasonal staff are employed, air ferrying is a specialized business and short-term employment is generally not considered to be desirable. Crew-flight limitations must also be taken into account (six consecutive round trips a day is the working limit) and, although an eight-hour shift system is worked, there is an economic level beyond which it is impracticable to increase the number of shifts, particularly as the increase is needed to cover relatively few days in each year.

Air Charter, by the same reckoning, find that their limitation is also one of trained staff. Although they recruit temporary stewards, loaders and other handling staff (some of the positions are popular with university students) dealing with passengers and accompanied cars requires more experience than can be obtained by semi-casual labour recruited for the busy season, particularly since the first physical limitation to be reached is likely to be passenger handling capacity at Southend. This can be met by an extension of the present buildings; perhaps surprisingly, in view of the number of movements at Southend (see Fig. 1) runway and apron capacity is not a problem. Should it ever become so, the number of stabilized-soil runways could probably be increased, but before that need arises Air Charter may well, they say, be operating larger aircraft.

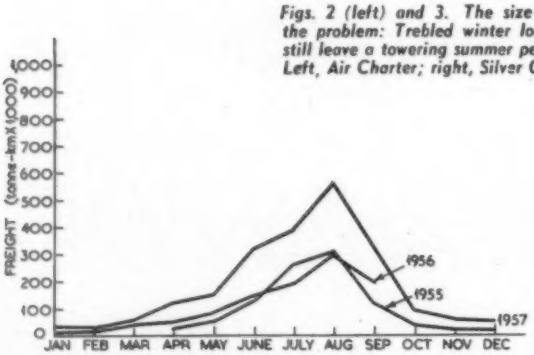
Meanwhile, the airline's short-term solution to local traffic peaks is to mount a three-shift system, to reinforce timetabled flights with additional supporting services (daily peaks occur mainly in the early morning) and if necessary to operate throughout the night if weather delays have resulted in an accumulation of travellers at the end of one day. Such measures are exceptional and only adopted in extremity; the high season lasts long enough for proper consideration to be given to reasonably regulated working hours for the staff. Of those travellers who have to be refused a particular flight or a particular day, about 75 per cent accept an alternative service, possibly starting their holiday a day or two later, on a Monday or Tuesday. It is these passengers, whose bookings are postponed or have to be refused, with which we are concerned here.

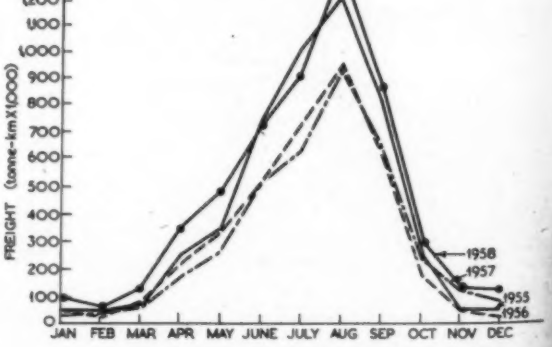
Sea ferry services, on the other hand, are more likely to reach saturation of their carrying capacity as a result of fleet limitations. Much larger capacity-units and lower frequencies inevitably mean that there is a maximum number of trips that can be crowded into reasonable hours for travel; and the fleet must be adjusted in considerably greater units of capacity than is the case with the much smaller transports used by the air ferries. It follows that less flexibility of services and timetabling is possible and, for economic operation over the whole year, the fleet capacity must be adjusted to operate at a satisfactory load factor having regard to the total number of cars and passengers carried throughout the year. Inevitably the wide fluctuations in seasonal demand result in the fleet operating at load factors of up to 100 per cent and business being turned away during the height of the season. The repercussion has been felt by the air ferries, whose bookings for peak-season travel have on occasions been noticeably swollen by passengers who waited too late to take their cars by ship. The airlines' greater flexibility allows some extra services to be mounted to meet an occasional exceptional demand. Even so, saturation point is reached by both air and sea ferries at summer weekends.

An interesting comment upon the respective limitations of the sea and air ferries is that while the latter's fleets have remained almost static (Silver City: 14 Bristol 170 Mk 32, six Bristol 170 Mk 21; Air Charter: eight Bristol 170 Mk 32, one Bristol 170 Mk 21), the service operated jointly by British Railways and Societé National Chemin de Fer is increasing its fleet this year. *Maid of Kent*, a new ship capable of carrying 180 cars, is being commissioned this summer.

Now, however valuable a service the air ferries supply in providing quick access to the Continent for drivers, passengers and cars, the service is not entirely satisfactory if it cannot accommodate

*Figs. 2 (left) and 3. The size of the problem: Trebled winter loads still leave a towering summer peak. Left, Air Charter; right, Silver City*



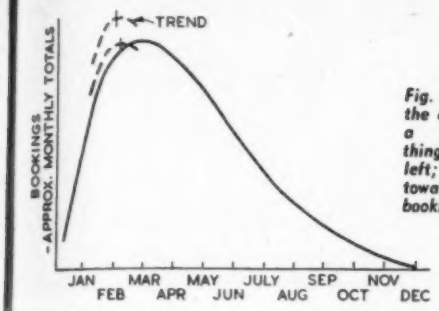



*Fig. 5. Bookings for the air ferries follow a pattern something like that on the left; the trend is towards even earlier bookings each year*

all of those who want to travel with their cars at the time they wish to do so. Nor is the public demand being satisfied if bookings for the peak season have to be made in January or February (however advantageous this may be to the airline). It can quite fairly be said that, by lowering their fares and so attracting more traffic, the air ferries have brought upon themselves this very real problem of excess demand. And a glance at the seasonal freight pattern (Figs. 2 and 3) of Air Charter and Silver City seems to show that, as the volume of their traffic has increased, so has the intensity of the summer peak.

Can a case, then, be made for another carrier to operate a car and passenger ferry on the cross-Channel route to France, and so relieve the peak summer load?

In considering the implications of such additional competition (by a purely hypothetical airline) it must be asked if advantages other than those of an extremely transient nature could be offered; and whether, if they could not, there are any alternatives that have not already been adopted by two commercially successful and very progressive airlines.

At the best, competition between airlines can be expected to produce greater frequencies of service, better standards of service in respect of speed and comfort, a choice of classes where none or only one existed before, and possibly lower fares. It *may* result in the generation of more traffic, although whether in fact it would do so is dependent upon a number of external factors. On the Channel routes, competition clearly already exists, and consideration of standard of service, speed, comfort or classes of travel has never been called to question; those existing are more than satisfactory for a 20- or 30-minute journey.

Looking again at Fig. 2 (the graph relates to freight and includes accompanied and unaccompanied cars) it is apparent that in spite of strenuous efforts by both carriers to increase their off-season traffic—which they have in some cases succeeded in trebling—the total volume remains low. By confining to this season major overhauls, charter business, and as much business traffic as possible on the car ferries, a reasonable utilization for some of the fleet is attained. Aircraft not in use can be mothballed for the winter. Although the carriage of freight can be used to offset the sharp decline of car traffic in the off season (freight demand has different peaks and is usually at a minimum during the height of the holiday season) the overall effect is not large, and the airline's difficulties are increased by the need for a freight carrier to be able to offer a year-round service. Figs. 2 and 3 show the combined freight and car traffic for recent years.

Thus, to introduce additional competition to the specialized Channel ferry business must result in a third airline sharing the seasonal problems of the others, to the detriment of all. It seems fair to conclude that the introduction of more competition is not a justifiable solution to the problem of peak traffic relief, since a third carrier would again not be able to satisfy peak demand if an economic level of operation was to be maintained throughout the remainder of the year.

Two possibilities, however, may be suggested. Since the high-summer limitation is primarily one of operating staff, and secondly of an economic fleet level, it might be possible for aircraft and crews to be hired from airlines in other parts of the world where a peak problem does not arise at the same time. Because the specialized nature of the operation virtually if not absolutely demands that the fleet be Bristol Freighters, the field of selection is clearly a very narrow one; but there might be possibilities of chartering from airlines such as M.E.A., Saudi Arabia or Iberia. Additional crews and fleet might enable a night operation to be mounted on peak occasions and a lower overall level of fleet to be maintained throughout the year.

A much more attractive alternative, and one that has been kept under review, is to work a turn-and-turn about service with an operator in the Southern Hemisphere, where the holiday season falls over the Christmas period.

The difficulties are only too obvious. Firstly, a suitable operator must be found with whom an exchange agreement can be made, or a reciprocal type of operation in the Southern Hemisphere must be developed. The problems of staffing and maintenance must be solved, and business found to make the transfer worthwhile. But it has been done; Trek Airways, for example, manage quite successfully to find business in Europe during the summer and holiday business in South Africa during our winter.

Even assuming that the first carrier to adopt such techniques will be able to reckon on carrying considerable extra traffic at peak periods—the surplus that the other Channel ferries must turn away—the economics of such a policy may still be open to doubt, since crews must be trained (fortunately the cross-Channel routes are on a network where the terminals are in close proximity), aircraft maintained and brought to a common standard, and so on. And the additional capacity could be used to the full on only about one-third of the period for which it was needed. So deeply entrenched are British travelling habits that the device of differential fares has only a limited effect in shifting demand from weekends to weekdays; if peak fares are raised beyond a certain level it is probable that traffic will tend to fall off. Nevertheless, there are some signs that holidaymakers are becoming more flexible about when they travel, and the device of charging peak fares may have a long-term effect on breaking down resistance to mid-week travel.

There is another possible solution to the cross-Channel peak problem which, although also decidedly long-term, must not be overlooked. That is the Channel tunnel. Little has recently appeared in print about this project, but investigation is still proceeding very actively. It is not yet finally established whether cars would drive through the tunnel under their own power (extraction of exhaust fumes is the principal problem) or whether they would be carried through on a train. In the latter case the relatively large numbers of cars that would have to be loaded and unloaded each trip would show to disadvantage over the greater flexibility of the air ferries. A motor tunnel, on the other hand, might offer a relatively cheap and convenient method of coast-to-coast travel; and, because the depreciation of a tunnel would be very much slower than that of an aircraft or a boat, and overhead charges would vary less with the amount of traffic carried, the Channel tunnel could offer a solution to the seasonal problem.

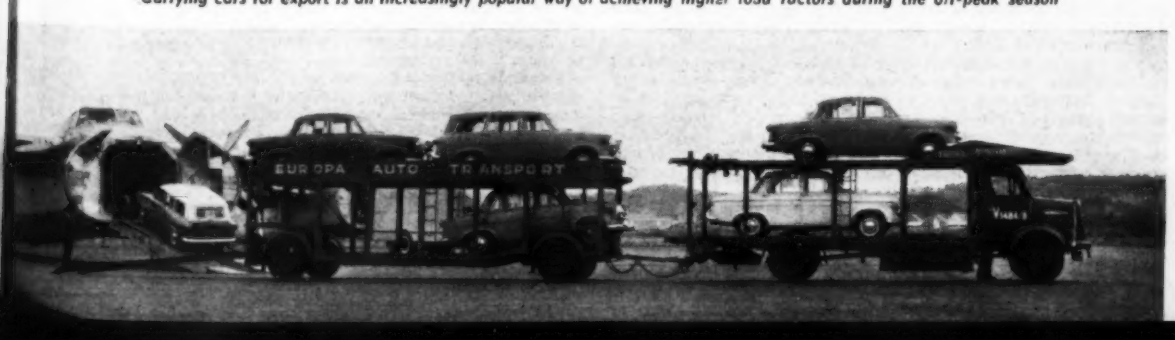
The ideal, from the Customs and handling point of view, is a steady stream of vehicles passing a given point at known regular intervals. The air ferries inherently come closer to achieving this than ships, and will continue to do so even when they use larger aircraft. But a tunnel—even with a random flow of cars—could provide very fast processing indeed. (Although admittedly less elaborate than a port control, the tolls on U.S. turnpikes are a parallel which work well enough.) And because the operation of a tunnel requires only a small number of staff in relation to the throughput of cars, by charging a toll on a basis of average annual traffic it could operate on a 24-hour basis and could be made to work economically in spite of a fluctuating load factor.

So far, only the relief of the summer peak has been examined, but it is clearly necessary (as Air Charter and Silver City have actively been doing) to tackle the problem at both ends. In the past three years considerable additional traffic—including, particularly, racehorses and export cars—has been carried during the winter. In volume, though, uplift during the worst winter months is still well below the summer peak, amounting to about one-fortieth of the tonne-kilometres flown in the peak months. Not surprisingly, the two airlines find it quite difficult to obtain charter business when capacity can be offered freely only at limited periods of the year.

One line of attack which does not yet seem to have been fully explored is that of attracting the winter-sports enthusiast to make

(*Concluded on page 445*)

*Carrying cars for export is an increasingly popular way of achieving higher load factors during the off-peak season*



# East Germany and the BB.152

NOTES AND IMPRESSIONS FROM THE LEIPZIG FAIR

EAST GERMANY'S first jet transport, the BB.152, is now in series production, with a planned output of six aircraft in 1960, rising to 18 the following year. This was disclosed at the Leipzig Fair, where the type emerged as a serious commercial and export proposition. This disclosure, however, came before the crash on March 4 (*Flight* last week), although as yet there is no confirmation that this was the one example flying, as is widely believed. Research Director Prof. Brunolf Baade, seen with his usual broad grin at the Fair, would say nothing other than the crash "was not caused by material defects." He stated that the veil of secrecy would be lifted "in a few days" when the investigation was completed.

Representatives of British companies exhibiting at the Fair may owe their lives to the East Germans' interest in buying Rolls-Royce engines (probably Darts). They had arranged a visit to Dresden and a flight in the 152 on the same day; but the party was diverted to Pirna because of the priority given to the Rolls-Royce representative's wish to see the engine design establishment there. Thus they only saw the 152 in flight, and not the Dresden production facilities. Meanwhile, officials of the VEB Kooperationszentrale für die Flugzeugindustrie (State-run aircraft enterprise) were tight-lipped on questions of orders, customers, delivery times and prices. "We are confident of plenty of business," the sales manager stated at Leipzig, "but to give out such details would put ourselves at the mercy of our competitors." It was understood that export deliveries would start next year, and that the eastern Deutsche Lufthansa would have 152s in service at the same time. East Germans at the Fair appeared sure that they had a winner, since the aircraft fills a gap in the existing world range of jet transports. They regard the Caravelle as the only competitor, and feel they have an edge over it on passenger miles per hour per unit cost.

The aircraft display at Leipzig was housed in a 900-square-metre pavilion, and included a mock-up fuselage of the 57-passenger version of the 152 and an example of the Pirna O14 turbojet (6,945 lb thrust), with separate exhibits of the compressor, turbine and combustion chamber. The interior of the fuselage was pleasantly finished in grey, with strip lights extending along the full length of the ceiling; but the colour scheme was marred by brown curtains covering the oval windows. Design of the seats (in rows of two and three) showed considerable attention to weight saving and comfort. Weighing 24 lb each, they have light alloy frames and foam-rubber cushions. Moulded backrests are reclinable, and padded armrests on the aisles pivot for ease of entry. Safety belts are concealed in zip-closed compartments at the base of the backrests. "To satisfy operators who don't require belts," an official explained. Emergency oxygen masks are contained in fabric-covered recesses in the top rear of each seat, with flow indicators at the bottom. Curiously, reading lamps are also placed on the seat backs, thereby shining in passengers' eyes. Another oddity is the standardization on Meissen porcelain instead of plastic dinnerware. ("We buy it in Dresden—very cheap.") The prestige value of this famous china is felt to counterbalance the greater weight, replacement cost and hazards in the event of breakage in bad weather. Paradoxical, too, are the glass-topped tables, and the use of heavy plywood and block-board for fitted cabinets and doors.

Two prototypes of the BB.152 have already been built, it was learned, and the maiden flight took place in December last year. The first model had an under-belly bicycle landing gear with wing-tip stabilizing wheels, but this design has now been changed to a tricycle arrangement, with side wheels housed in the rear of the twin-jet pods. The standard version is a 57-seater, but 48- and 72-passenger layouts are also planned. Main dimensions are: span, 88.6ft; length, 103ft, and height, 29.5ft. Normal take-off weight of the standard type with 13,865 lb payload and 21,870 lb of fuel is 98,100 lb. Maximum speed is stated to be 570 m.p.h. (at 15,750ft), cruising speed of 497 m.p.h., and landing speed 124 m.p.h. Take-off run (at 102,510 lb) is 3,230ft and landing run (35 metric tons) 2,260ft.

The main airframe production plant is at Dresden; the engines are designed at Pirna and are built at Ludwigsfelde. Facilities are limited, however, and the East German industry is anxious to import from the West whatever it can in the way of semi-finished materials, components, instruments and accessories. Responding to this potential demand, more than a dozen British equipment producers displayed their wares on a collective stand at Leipzig.

*The model of the BB.152 exhibited at the Leipzig Fair.*

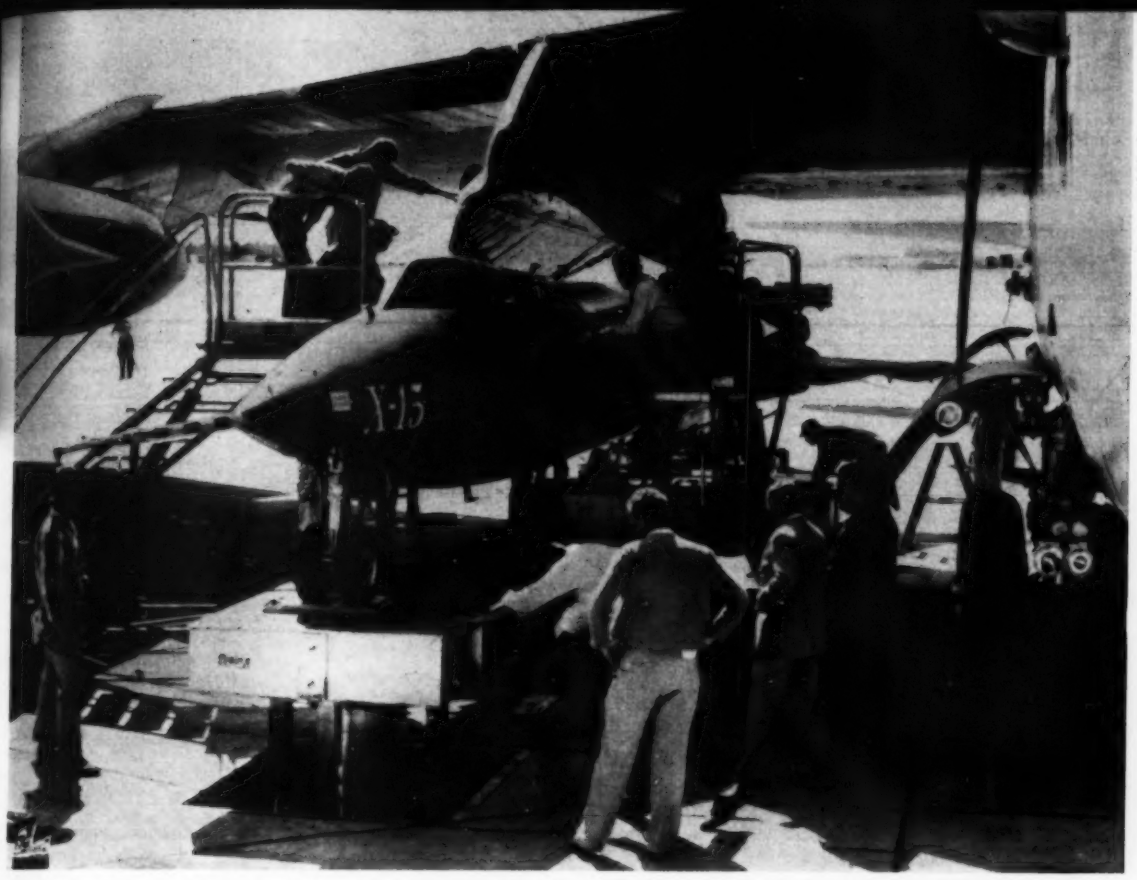
These included Accles & Pollock, James Booth, Elliott Brothers, E.M.I. Electronics, Ferranti, High Duty Alloys, Napier, Samuel Osborn, Richard Thomas & Baldwins, Rotol, Simms Motor Units, Sir George Godfrey & Partners, Smith's Stamping Works, and Smith-Clayton Forge. Elsewhere on the fairgrounds, Guest, Keen & Nettlefolds and Marconi had individual exhibits.

In a private interview, Prof. Baade told a *Flight* correspondent that the 152 was an economic, not a prestige, venture. He listed several reasons for building a commercial jet in a country where production of most capital equipment and consumer goods falls below the real needs: (1) Making aircraft provides accelerated solutions for problems arising in other branches of industry, by putting abnormal stresses on alloys, steel and other materials, and bringing more rapid development in quality. (2) For East Germany, poor in raw materials, it is economically advantageous to export products with the highest possible labour-to-weight ratio. Aircraft production and skilled manpower are traditional to this part of the country, since before the war it accounted for 60 per cent of the German aircraft industry. (3) There is a large potential world demand for medium-range jets, and the 152 will have a monopoly in its class in the eastern bloc because of joint economic planning and international division of labour. This has established Russia as the sole producer of large jet transports, with Czechoslovakia concentrating on piston-engined machines. Thus East Germany has a monopoly in its field, with many potential customers among allied states.

As for manufacturing problems, Prof. Baade acknowledged the lack of facilities for making such a complex piece of machinery. East Germany was as yet not producing such materials as large alloy-sheets and the big forgings needed for landing gear, and in view of the limited quantities needed it would be extremely costly to build the plant for these components locally. In order to minimize new investment and make up for lost time it was hoped to purchase these items abroad, as well as communications and navigation equipment, and even complete engines. The use of western components in the 152 would greatly ease servicing problems if the aircraft were sold to non-Communist operators—as is intended. Britain has emerged as the most likely supplier, and this was reflected by the U.K. exhibits at the Fair. For example, Elliott Brothers hope to sell intercom. equipment, passenger address systems, and radio and navigation-aid selectors. They are linked up with Marconi, who are probing the market for radio and navigation equipment. Guest, Keen & Nettlefolds are reported to have received an order for metal products.

As for strategic restrictions on such exports behind the Iron Curtain, Prof. Baade argues that East Germany could make counter-deliveries of equally strategic items—advanced machine tools, for instance. Thus, he believes, both sides would have a vested interest in maintaining deliveries "and not shooting their customers." Prof. Baade also made some comments on the design of the 152. Contrary to Russian and British practice, it has podded jets, American style. "He favours this arrangement," writes our correspondent, "because it doesn't disturb the wing form and lift, minimizes fire risks, simplifies engine servicing and replacement, and reduces interior noise. The higher drag is compensated for by the smaller wing required and by lower losses in shorter jet pipes." In respect of performance, Dr. Baade stated that the 35-degree swept wing had been successfully tested to Mach 0.9 in the wind tunnel at Dresden, which is understood to have two tunnels (low speed, 197ft per sec; high speed, Mach 1.0). In addition, he believed that the Pirna O14 engine was capable of development to 7,700 lb thrust. Further, the 152 could take off from and land at 45 per cent of the world's airports (55 per cent on short flights, with light fuel loads).

Baade is technical director of VEB Kooperationszentrale für die Flugzeugindustrie and director of the East German Research Institute. He lived in America from 1929 to 1936, when he had connections with General Aviation, Goodyear, Fokker and other firms. He designed for Junkers during the war and worked in Russia from 1946 to 1954.



*Most ambitious manned vehicle in existence for space research is the North American X-15, the first captive flight of which was reported in last week's issue. This photograph shows preparations for the attachment of the X-15 to the wing pylon of the parent B-52. The first flight was cut short following a high-temperature indication in the research aircraft, but not before 38,000ft and a speed of Mach 0.8 had been reached*

# Missiles and Spaceflight

### "DEAD" DISCOVERER

The U.S. Defense Department reported on March 17 that Discoverer I, the first Earth satellite to be launched into a polar orbit, was lost and "presumed dead." It was no longer transmitting radio signals, and efforts to track it with radar had failed.

The estimated life of the satellite, which was launched on February 28, had been given as 30 days. Confirmation that Discoverer was in orbit was announced by the Defense Department on March 5, when 41 tracking reports from Hawaii, Alaska and the U.S.A. were quoted. Apogee was reported as 519 miles, perigee 176 miles, and orbital period 95.6 min.

### PIONEER DATA

Details of the solar orbit achieved by Pioneer 4 (launched on March 3) were given recently by the U.S. National Aeronautics and Space Administration. With an average speed of 64,800 m.p.h., the probe was stated to have an orbital period of 394.75 days. It was closest to the Sun, at 91.7 million miles, on March 17, and would be farthest away, at 106.1 million miles, on October 1.

The launching errors included −4.5 deg in elevation and +1.3 deg in azimuth, and the maximum velocity attained was 24,789 m.p.h. (196 m.p.h. lower than planned). The probe was tracked for 82 hr 4 min to a distance of 407,000 miles, and it passed the Moon at a distance of 37,300 miles.

### U.K. SATELLITE OBSERVATIONS

A report on U.K. observations of artificial Earth satellites and associated research was presented by the British delegation at the second meeting of the international space-research committee COSPAR, held in The Hague on March 12-14. The report was prepared by the IGY artificial satellite sub-committee and originally presented to the first meeting of the British National Committee on Space Research on March 4 in London.

In a foreword to the report, Prof. H. S. W. Massey summarizes the main British results as follows:—

"The effort made in the United Kingdom to extract the maximum of scientific information from the launching of artificial earth satellites has not only been on a considerable scale but also very effective.

"A major contribution was made in the observation of the first Russian satellites for which the British data obtained by radio, radar and optical methods were of first quality. Because of this, new information about the ellipticity of the Earth has been forthcoming at an earlier stage than expected.

"Valuable contributions have also been made to the study of the effect of air drag on satellites and its interpretation in terms of air density. The indications from this work about the variability of this density are among the most interesting of the discoveries made from the study of satellite orbits.

"Much progress has been made on the study of radio propagation from the Russian satellites and it is abundantly clear that this will yield results of first rate importance for the understanding of ionospheric behaviour.

"The value of British observations of telemetred signals from the Explorer satellites has been recognized by the U.S.A., and the Jodrell Bank radio telescope has proved to be of vital importance for the reception of radio signals from the American lunar probes.

"The setting up of World Data Centre C at Slough in association with a national satellite centre provides the basis for maximum availability and utilization of data obtained throughout the world.

"There is no direction concerned with the tracking, telemetry reception and analysis of orbit data which has not been actively pursued. The effort involved has built up to a degree well beyond the scale contemplated at the first meeting of the IGY Artificial Satellite Subcommittee in September 1956 but it is equally true that the results already obtained also exceed the most optimistic expectations."

### MONEY FOR MERCURY

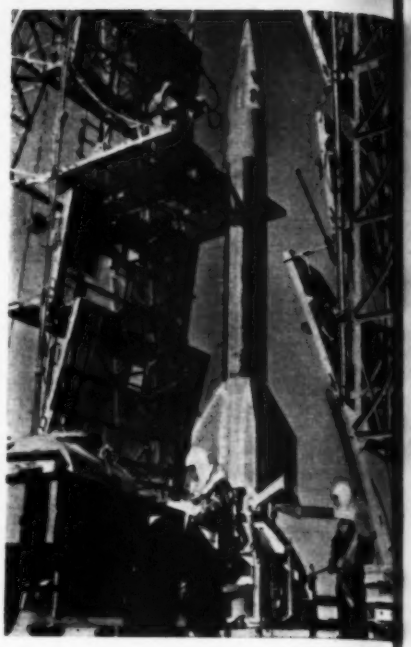
Supplementary funds requested by the U.S. National Aeronautics and Space Administration for the 1959 fiscal year include $20.75 million for research and development, all of which is intended for the Project Mercury manned spaceflight programme. The original allotment devoted to manned spaceflight (as shown in the research and development budget figures printed in *Flight* of February 13) was $37.66 million. For 1960 the cost of Project Mercury is estimated at $70 million, and NASA administrator T. Keith Glennan has stated that the total bill will exceed $200 million before completion of this programme.

Other supplementary estimates for NASA include $24.25 million for construction and equipment, of which $12.05 million is for new tracking facilities, $3.2 million for propulsion test facilities and $9 million for other new facilities and modifications at the Jet Propulsion Laboratory; and $3.354 million for salaries and expenses. Approval by Congress of these supplementary estimates has given NASA a total of over $384 million for the current fiscal year.

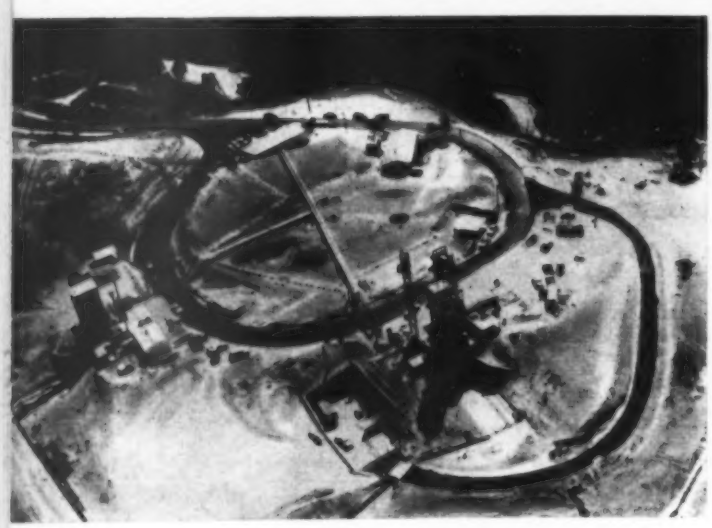
## *Missiles and Spaceflight . . .*

### CO-OPERATIVE RESEARCH

A suggestion that the U.S.A. was contemplating launching an artificial satellite from the rocket range at Woomera was described as "a little premature" by the Minister of Supply in the House of Commons on March 16. The Minister had been asked by Mr. Roy Mason the extent of co-operation with the U.S. Government in furthering space research from Woomera, and had said in reply: "The tracking of satellites at Woomera is done in collaboration with the United States, and the results of upper-atmosphere research conducted at Woomera with British rockets are made available to the United States and other countries under the arrangements for the International Geophysical Year." Mr. Mason asked also whether this country was to launch its own satellite programme. The Minister's reply was noncommittal.



*Right, a French Veronique rocket being prepared for launch during the recent series of upper-atmosphere soundings from Hammaguir, near Colomb-Béchar in the Sahara*



*Left, the U.S.A.F. Ballistic Missile Division test stand at the Lockheed Missile Systems Division's base at Santa Cruz, California. Static-firing tests of the Thor-Hustler vehicle which launched Discoverer I were made here prior to its shipment to Vandenberg A.F.B.*

### WOOMERA OUTPOST

A prefabricated town is to be built near Port Hedland, on the north-west coast of Australia, as a forward observation and research base in connection with missile-testing at the Woomera rocket range. In addition to an airstrip and test facilities the site will have customary township amenities. Known as Talgarne, the town will be developed in stages, £400,000 having been provided to cover the cost of initial development. The base is located about 1,250 miles from Woomera, and will be used for observing land and sea target-areas in tests of new long-range weapons.

# SATELLITE NAVIGATION AND CONTROL

**THIS discussion of navigation and control problems of artificial Earth satellites is taken from the recent Royal Aeronautical Society paper "Earth Satellites," by W. H. Stephens, M.Sc., F.R.Ae.S., Director-general, Ballistic Missiles, Ministry of Supply**

BEFORE we can make practical use of the propulsion and structural design possibilities to launch instrument or human payloads into chosen paths around the Earth, or between the Earth and neighbouring planets, we have to solve the navigation problem. Essentially this reduces to the provision of means to determine precisely the vector velocity required at any point to achieve a desired destination, and of the vector acceleration necessary to make navigational corrections as soon as any errors in velocity are noticed. If we take a three-stage vehicle as example, the velocity and position of the missile at cut-off of the second stage decide the velocity and position of the third stage when it reaches maximum altitude. At this altitude the increment in velocity required to reach orbital condition is provided by the third-stage motor. Obviously the direction or magnitude of this velocity increment will control the extent to which the orbit differs from a circular orbit.

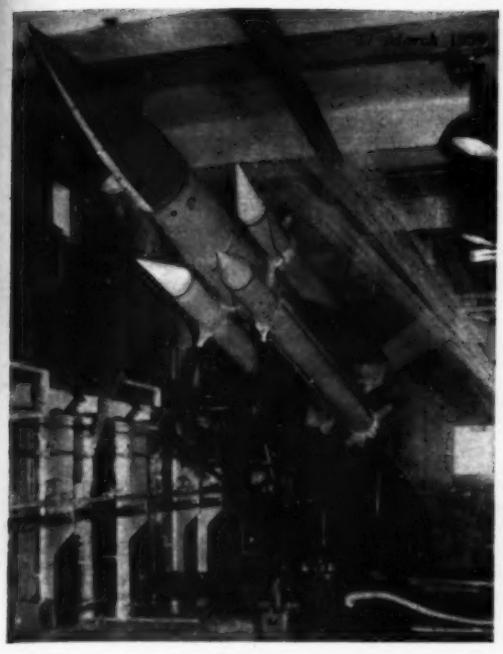
In most of the satellites so far launched no attempt has been made to control precisely the duration of the final thrust, and the tendency has been to give an excess of thrust so as to ensure that an orbit can be achieved despite errors in direction of the final acceleration. The result has been to produce apogee higher than perigee. In the Explorer satellites, which were four-stage vehicles, the velocity and position at first stage burn-out were determined by ground observation. The time to reach the apex of the coasting trajectory was then computed and firing of the final motor stages was started by radio command from the ground just before reaching apex. The direction of the final thrust was controlled by autopilot, which tilted the final stage by air jets to align their axis along the local horizontal at the apex point. By this means complexity in the final stages of the vehicle was held to a reasonable level, but the method would be subject to considerable errors if a precisely defined circular orbit was an important objective.

For many scientific investigations and especially for reconnaissance and astronomical satellites, it would be necessary to stabilize the satellite (or equipment in it) to a known orientation. The satellite might be stabilized approximately (to a few degrees) and the equipment accurately (to a few minutes of arc). In addition the orientation of the satellite must be referred to a system of axes, which might be fixed in space, relative to the Earth or relative to a line joining the satellite to the centre of the Earth. Such a satellite referred to space axes would make one rotation during each orbit of the Earth. In a similar manner a satellite stabilized with one axis pointing to the Sun would make one rotation each year when referred to space axes, i.e., approximately one degree per day rotation.

The problems of control using reaction thrust from gas nozzles are an interesting subject for investigation. The energy required can be stored as compressed air or, chemically, as one of the monofuels such as hydrogen peroxide or isopropyl nitrate. The latter will result in less weight but would only be suitable for use within a reasonable time of launch. They could certainly be used for removing any large angular momentum produced at the termination of thrust. After this it would probably be preferable to use a method depending on the conservatisms of angular momentum. In addition, rates of rotation could be reduced by means of the translation of masses away from the centre of gravity of the satellite (i.e., a change in moment of inertia). The engineering problems to produce accurate control would appear to present no insuperable difficulties.

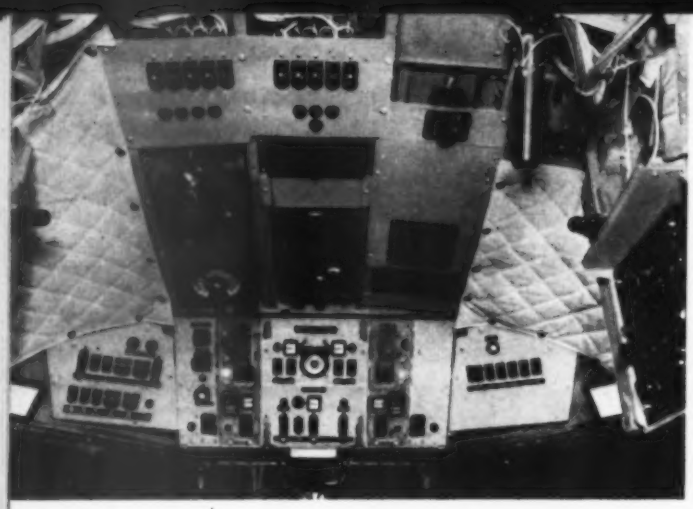
Provision of the reference system may prove more difficult. For space stabilization the fixed stars are an obvious choice. However, it would be necessary to lock on to two stars prior to launch. In addition, eclipse of these stars by the Earth would necessitate a subsidiary system. Thus it would appear necessary to have a gyro-stabilized platform with the star tracking system mounted on it. During the eclipse of the stars the drift of the platform must be small in order that the optical system locks on to the same stars when they come into view. This requirement would specify the accuracy of the stable platform and gyroscopes.

Given such a system the best results would be achieved by a suitable combination of the outputs of the optical system and the gyroscopes. The theoretical background to make optimum use of a mixed system of this type is well understood. It is evident that having gone this far, it might be reasonable to include three accelerometers, mounted orthogonally on the stable platform, to give a complete inertial navigator. Such a system could then be used in the boost phase of satellite launching for guidance. In addition it could be used to control the direction and magnitude of final thrust.



# THUNDERBIRD'S COMMANDO COURSE

*At English Electric's Stevenage works Thunderbird missiles are subjected to simulated dust-storms, monsoon downpours and arctic temperatures. Flour-fine dust, mixed with sand, is sprayed over the missiles and their launchers for thirty minutes at a time; after twenty minutes have elapsed the equipment is tested and at the end of the half-hour it is inspected to make sure that no dust has forced its way inside. Rainstorms are simulated by water sprays; and salt sprays ensure that the weapons are unaffected by being kept action-ready in coastal areas. Freezing tests last for fourteen days, during which the missile is kept at minus 20 deg C. Working components are tested daily. Top left, water; right, dust; below, ice*



*The roof and main panels in the Dart Herald cockpit, at left, are neatly arranged against a pale blue background. Two red strips of emergency controls are immediately above the middle windscreen panel. The central warning panel is just below the glare shield*

# HANDLING THE HERALD

BY MARK LAMBERT

THE general impression I gained from flying the Handley Page Dart Herald at Radlett last week was that the aircraft is simple, responsive, comfortable and tough—in fact, a true pilot's aeroplane. During more than two hours of general exercising and experimenting, four of us with widely varying experience put it through its paces pretty thoroughly and we all agreed afterwards that it was well worth-while. The actual machine was G-AODF, the second prototype, powered by two Rolls-Royce Dart RDa.7s, giving 2,100 e.h.p. each at take-off. Maximum gross weight is 37,000 lb and I flew it at about 34,500 lb with almost full tanks, two batteries of auto-recording test instruments, about eight people and a considerable quantity of ballast. The c.g. was at 30 per cent s.m.c., that is, at the mid-position.

The cabin was mostly furnished, and had several rows of seats; but the forward end of the passenger compartment had only basic sound-proofing because of the numerous additional wiring harnesses concerned with the test instruments. The flight deck, laid out for two-pilot operation, is considerably raised above the cabin floor level, but is roomy and comfortable and all switches and levers are well within reach. The windscreen is generous by modern airliner standards and the visibility is above average. Both wing tips can just be seen from either pilot's seat and nearside visibility extends to the air-conditioning intakes beside the Darts.

The immediate impression is one of neat layout and good grouping against a pleasant background of pale blue crackle finish. Fuel-flow and -quantity gauges, cabin-pressure and -altitude, and similar indicators are grouped together with the main engine instruments on the central panel. On either side are the duplicated flight-instrument panels for the two pilots, including I.L.S. and Sperry Zero Reader cross-pointers. A very neat central pedestal carries, from front to rear, throttles, h.p./feathering levers, ground-fine pitch lock, parking brake and throttle friction lever. Aft of these are the fuel trimmer switches, main and emergency flap and undercarriage controls, worked by levers and push-button.

The flap control has only three positions, up, take-off and down, flap position being indicated by a battery of six small lamps on the engine panel. The top pair of white lamps indicates flaps in transit and pairs of green lamps light when the flaps reach the appropriate setting. A conventional three-light undercarriage indication is also on the engine panel. Elevator, rudder and aileron trim wheels mounted in their natural senses and incorporating their own indicators are disposed at the rear of the pedestal, immediately beside the pilots. Although the rear and centre portions of the central pedestal are within very comfortable reach from both seats, they do not interfere with access and I found that I could jump quickly into the right-hand seat without clambering or bumping into anything. Additional controls and switches are disposed along two consoles against the cockpit walls.

Ample roof panels accommodate the various radio controls and, immediately aft of the windscreen, there are the engine emergencies, starting, water/methanol and fuel system switches. Two red panels, one for each engine, carry switches for full feathering, l.p. cock, boost pumps, fuel-pressure warning lights and two-shot extinguishers. These can be quickly operated in an emergency. Just in front are two cut-outs for isolating the electrics.

Another feature is that all electrical, engine and propeller warning lights are mounted together immediately below the centre windscreen panel. If, for example, a generator fails a rectangular red panel will light up and clearly illuminate a black "GEN" engraved on its face. A small orange lamp at either end of this panel indicates operation of the feathering pumps.

The flying controls themselves consist of adjustable rudder pedals with toe bars for controlling the powered hydraulic brakes and a conventional wheel and column for aileron and elevator. The columns themselves are mounted close to the cabin walls and swept inwards to reach comfortably in front of the pilots. The nosewheel is steered by means of a small tiller wheel mounted in the centre of the left-hand aileron wheel. Hydraulic steering jacks on the nosewheel strut are controlled by electrical micro-switches at the tiller so that the strut continues to rotate so long as the tiller is held over. Control on the ground during take-off and landing is excellent. The aircraft can be steered through the tightest turns without brake and was, during this demonstration, taxied with one engine feathered and turned sharply towards the live engine. The Goodyear brakes are without exception the best I have ever used, and the makers seem to have struck exactly the right balance between brake response, pedal movement and loads. The disc brakes are very powerful and have an anti-skid device.

Eight people went aboard the Dart Herald at Radlett with Handley Page test pilot "Spud" Murphy. The plan was to let four pilots fly it and play it off the cuff according to what each wanted to try. Spud started up, taxied out and made the first take-off. With the brakes on he opened up to the maximum of 15,000 r.p.m., paused briefly and then let go. Although the group of people standing behind the pilots took firm hand holds, the surge forward nearly shot them all into the back and the Herald was off the ground and climbing steeply in 12 sec after unsticking at 88 kt. Maintaining full throttle and flying at around 160 kt, we seemed to hold at least 1,800ft/min climb until we emerged from the cloud top at 4,500ft. The noise level was high in the fuselage section forward of the wing, but the completion of cabin furnishings should improve this to some extent. Having climbed to about 7,000ft, Spud throttled back to flight idling at about 10,000 r.p.m. and trimmed the Herald at 1.3 $V_S$ "clean" at 112 kt. Maintaining height as we slowed down, the Herald finally stalled straight ahead after a minimum of warning buffet. It was obviously a completely innocuous occurrence. Spud then lowered take-off flap and undercarriage and trimmed at 1.3 $V_{SL}$ at 95 kt. In this case there was a fraction more warning and the stall itself was a little more decided, once at 74 kt and once at 72 kt at 7,000ft. Holding it right into the stall we seemed to lose about 1,000ft of height. Finally, Spud lowered full flap and after a noticeable buffet at 70 kt the Herald stalled firmly at 65 kt with the wheel hard back.

During one of the series of stalls the right wing dropped about 20 deg but otherwise nothing very much seemed to happen beyond the clean break into the full stall. As soon as the stick was released the nose went firmly down and the speed built up immediately. This was certainly as viceless as one could wish.

Setting 13,500 r.p.m. at 5,000ft the level speed quickly built up to about 200 kt i.a.s. and the first visiting pilot took over for a brief series of turns. Since he was short of time, Spud then throttled back and descended at 190 kt at a rate of over 2,000ft/min. Till then, cabin pressure differential had been at 2 lb/sq in and cabin altitude at 1,000ft. Because the cabin skin had earlier been pierced to accommodate a trailing static the pressurization system was not able to produce quite the degree of air-conditioning one can expect in production aircraft, but with an o.a.t. of +5 deg C we were still quite comfortably warm.

Spud then flew in to join the circuit at 160 kt, lowering undercarriage and take-off flap when passing the maximum lowering speed of 144 kt on the downwind leg. He approached at 110 kt, reached the runway threshold at 90 kt and set it down at about 80 kt. Immediately afterwards he applied ground-fine pitch and brakes and these together had a marked decelerating effect to bring us to a standstill in what felt like between 300 and 400 yd. We dropped the first pilot and set off with a B.E.A. captain flying.

Having once more regained the sunlight above cloud after the same urgent take-off and spritely climb, the airline pilot settled down to wring the Herald out a little. At 200 kt he made several steep turns and produced a very considerable rate of roll. He then immediately called for an engine to be cut and Spud jerked the port throttle shut, pulled the h.p. cock back through its gate into the feathering position and operated the final feathering switch. There was no violent yaw and apparently no difficulty in holding the aircraft straight before trimming. After a while seven divisions of rudder were applied and half a division of aileron trim and we carried on at 160 kt with 13,400 r.p.m. on the good engine, turning quite happily in both directions. The port engine was then relit and the airline pilot made the descent and landed at Radlett. He obviously experienced no difficulty at all.

It was my turn next. With Spud Murphy steering the nosewheel during the first part of the run I took off, noticing that the Herald is best lifted off the ground at about 80 kt. There is no apparent swing at all and the rudder becomes effective very soon. The stick movement required to pull off is quite small and elevator control is fully effective immediately after leaving the ground. Raising of undercarriage and take-off flap caused virtually no trim change and only the faintest sink. Acceleration was very rapid and the aircraft immediately felt completely comfortable to fly. I cruised along below cloud for a time trying rudder and aileron controls separately at about 180 kt. The responses and forces seemed to be exactly right and the Herald flew like a natural aircraft without any of the pronounced elevator trim changes with change in speed which are characteristic of many present-day transports. I could put the Herald just where I wanted it or leave it to forge on by itself. Holding the nose level I wound the elevator trim wheel backwards and forwards and found both the gearing and effectiveness just right. This is an aircraft in which so many things seem to be just right.

Having seen stalls and single-engined flight, and being by now slightly pressed for time, I decided to go straight back and try a couple of landings. I flew slowly back to the airfield and noticed that trim changes caused by lowering undercarriage and then take-off flap were very slight and tail-down in each case. I could easily hold them with one hand without re-trimming. The most difficult part was to reduce speed, and the throttles had to be brought well back to keep the speed down during the descent. Full flap first caused a float-up and then a fairly decided change in both attitude and trim, but again the forces were not excessive and a quick movement of the trim wheel took care of it easily. Throttle response from the Darts was excellent and there seemed to be no difficulty in adjusting the angle of approach.

Handley Page have fitted a spring in the elevator circuit which tends to push the stick forward and increase longitudinal stability at the lower end of the speed range. Similar devices in such aircraft as the Convair 340 and the Friendship produce a pronounced positive stability, but in the Herald the spring action is not really noticeable although the stabilizing effect is fully achieved. The elevator is controlled by a spring tab and when the full movement of this has been taken up the remaining few degrees of elevator travel have to be produced by direct mechanical action and the stick force therefore rises sharply in the last couple of inches of rearward travel. I made my first approach a little slow and closed the throttles a little early and then reached the end of the spring tab travel during the round-out. I did not then apply the increased force necessary to bring the elevator fully up and we touched down on the main wheels just a fraction short of round-out. The nosewheel went down of its own accord, ground fine-pitch came in and I was delighted with the brakes.

Despite some cross-wind the landing did not seem to present any difficulty. When the aircraft assumed its nose-down attitude after full flap was extended the undershoot area and runway remained in full view throughout the approach. During round-out and on the ground visibility forwards was excellent. A second circuit confirmed all my impressions of powerful acceleration, very comfortable control, small trim changes and the ease with which the approach could be judged and its angle adjusted. I made the second landing very comfortably with 10 kt more over the hedge.

The Herald is completely natural and straightforward to fly and it is pleasant to see a workhorse aircraft which is fully equipped and intelligently arranged and which still retains flying characteristics which make it thoroughly enjoyable for the pilot.

"Flight" photograph

"Flight" photograph



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## RTN RE-EQUIPMENT OF THE

## EGI RRENT: THE Mk 2 VICTOR

*These arresting impressions of the Handley Page Victor B Mk 2 (four Rolls-Royce Conway RCo.11), were taken on the occasion of the visit of the Minister of Supply, Mr. Aubrey Jones, to the Handley Page production plants on March 13 (see "Flight" last week). Light-load take-offs have been accomplished in a distance of well under 400 yards*

"Flight" photographs

*The forthcoming visit to this country, for certification and demonstration, of a Meta-Sokol four-seater from Czechoslovakia is reported on this page. The latest version of the type is powered by a Walker M.332 engine which develops 140 b.h.p., and has a cruising speed of 137 m.p.h.*

# Sport and Business

A BRANCH of the Tiger Club has been formed at Sywell Aerodrome, Northampton, led by Charles Boddington and operating Tiger Moth G-AOXS. This, it is hoped, will be the first of a number of branches of the club operating outside the London area. Several additions to the Tiger Club fleet will be flying in this season's displays and races, notably the first British-registered Jodel D.117 G-APOZ, a second Rollason Turbulent (G-APLZ) and Arrow Active G-ABVE. The Active will incorporate a redesigned fin and rudder. Another newcomer to the club will be a second aerobatic Tiger, G-ANZZ, which is expected to follow in the inverted footsteps of the Bishop Tiger to such effect that it will be known as the Archbishop. In addition to these machines, the club expects to have four Tigers, three Hornet Moths, a Jackaroo and two further Turbulents available for the national air races.

Forthcoming club events include a display at Sywell over the Easter week-end (March 29-30), and an aerobatic training week at Sywell during April 5-12 organized by Colin Labouchere. Pilots interested in spending part of the aerobatic week with the club should contact Mr. Labouchere at Sculthorpe Old Rectory, Fakenham, Norfolk.

APPLICATIONS TO ATTEND the Aerial At Home at Woburn Abbey on May 2 should be made to the Royal Aero Club by April 17. The programme includes a reception by the Duke and Duchess of Bedford, lunch, a tour of the Abbey and grounds, a demonstration by aircraft of the Shuttleworth Trust, and tea. Visitors will pay a £1 landing fee and there will be a sealed time-of-arrival competition. Aviation was one of the interests of the Duke of Bedford's grandmother, the eleventh duchess, who learned to fly in 1926 at the age of 61 and who disappeared on a solo flight from Woburn in 1937.

A CZECHOSLOVAK META-SOKOL aircraft is due in this country at the beginning of next month, and will be evaluated by the Air Registration Board for British validation of its Czech certificate of airworthiness. The machine will be based initially at Croydon, and flying demonstrations will probably be arranged at Biggin Hill. The power of the Meta-Sokol has recently been increased from the 105 b.h.p. of the Walter Minor 4-III to 140 b.h.p. provided by a Walter M.332, and the provisional U.K. price of this latest version is £4,400 including import duty. Enquiries concerning the British demonstration tour of the aircraft should go to G/C. E. L. Mole, Aircraft and General Finance Corporation Ltd., 3 Red Place, Green Street, London, W.1.

FOLLOWING THE DECISION of Goodhew Aviation Company Ltd. to cease operating Oxford Aeroplane Club at the end of last month, a new company has been formed to ensure the continued existence of the club at Kidlington. Directors of the company comprise Peter Clifford, Kerr Elliott, Peter Jewson, Stan Jewson, Patrick Raison and Rex Smith, who has taken over as manager and chief flying instructor. Peter Clifford is continuing as club chairman for 1959. A recent club newsletter emphasizes that visiting pilots and aircraft will still be most welcome at any time at Kidlington.

A THREE-DAY TOUR covering a distance of 700 miles and including visits to six aerodromes is to be made by a group of aircraft from Fair Oaks Aero Club over the Easter week-end. From Fair Oaks on Saturday, March 28, the route is via Ipswich (for lunch) to Brough; on the following day calls will be made at Sywell and Lulsgate; and on Easter Monday the group will return to Fair Oaks via Roborough and Thruxton. Five Tiger Moths, three Austers, two Chipmunks and a Taylorcraft will be used. Following a successful visit to the control tower at London Airport on February 25, a second visit there by a group of Fair Oaks members was planned for the evening of Wednesday, March 25.

A STRONG TEAM is being entered by the R.A.F. Gliding and Soaring Association for the 1959 National Gliding Championships at Lasham (May 9-18). Captained by G/C. N. W. Kearon, and with A. Cdre. G. J. C. Paul as team manager, this year's R.A.F. entry will have higher-performance sailplanes than ever before. The team is divided into two groups, the first of which consists of pilots with previous Nationals experience, and the entire contingent of pilots and ground crew, numbering about 70, will form a self-contained encampment at Lasham.

The pilots in Team 1 are Sgt. A. W. Gough (Olympia 419X), G/C. N. W. Kearon (Skylark 3B), F/L. K. Fitzroy (Skylark 3B), S/L. J. L. Bayley (T.42 Eagle) and Sgt. J. Williamson (Olympia 401). In the second team are F/O. D. Cretney (Gull 4), F/L. E. W. Clarke (Kranich), S/L. J. G. Croshaw and Cpl. K. V. Newholme (Olympia 2), S/L. N. Maygothling and F/L. F. Allen (Olympia 2), Cpl. W. R. Longley and S/L. E. T. Ware (Olympia 2), and P/O. D. Campion as reserve.

Air Cdre. Paul, the team manager, was the original founder of the R.A.F. Gliding and Soaring Association ten years ago, and recently retired from the R.A.F. to become secretary-general of the Air League of the British Empire. The present R.A.F.G.S.A. chairman, G/C. R. R. Goodbody, will act as deputy team manager during the championships.

AT THE KRONFELD CLUB on Wednesday, March 11, a new electric variometer designed by Peter Davy and Peter Bulman of the Cambridge Gliding Club was the subject of much interest among glider pilots present. Six of these instruments have been built and, it is expected, will be used during this year's national championships at Lasham.

IMPRESSIVE STATISTICS showing that private flying in the U.S.A. is big business were published recently by the Aircraft Owners and Pilots Association of Washington, D.C. During 1958, the Association reported, a total of 6,414 new private aircraft were sold by the U.S. industry, with a total retail value of $127.5 million. Of the "Big Three" companies, Beech sold 694 machines at an average price of $51,220; Cessna sold 2,926 at an average price of $16,813; and Piper's figures were 2,162 aircraft sold, averaging $16,372.

The October 1958 total of registered U.S. civil aircraft was 98,414, of which no fewer than 95,577 (97.1 per cent) were private aircraft. The number of airports available to civil aircraft in the U.S.A. is 6,919, all of which are used by private aircraft and only 569 by the airlines. At the major terminal airports—which form only three per cent of the total number—private aircraft were responsible for approximately 50 per cent of the total aircraft movements during 1958. The total of hours flown by U.S. private aircraft during the year was estimated at 11.5 million compared with 10.9 million in 1957.

*In the official caption to this photograph of the Russian A-13 sailplane, designed by Oleg Antonov, no mention is made of the interchangeable-wings feature previously publicized (two sets of wings were used, one for aerobatics and the other for distance flights)*

# The Economist

PLAIN MAN'S GUIDE TO UNLUXURY FLYING : VANCOUVER — AMSTERDAM AT 34-INCH SEAT PITCH

By KENNETH OWEN

"Flight" photograph

A LOT of words have been devoted in recent months to the business of pure-jet competition across the Atlantic. Fast, smooth, luxurious travel, Blue Ribands and all that. You won't hear any more about that sort of aviation in this article, which concerns bread-and-butter flying—with the butter spread really thin. I refer to economy-class travel. Apart from the pages of *Flight*, it may be that you haven't read much about the existence of this class, because airlines and manufacturers tend to lock up the economy section of the aircraft when they are giving demonstration flights to the Press, or so one gathers from the resulting rhapsodies of custom-styled, hand-tooled leather ashtray-cum-cocktail-mats in the de luxe lounge.

This is the story of an economy-class flight from Vancouver to Amsterdam in a Bristol Britannia operated by Canadian Pacific Air Lines. It was, I am sure, typical of many similar services by other operators with other aircraft types.

Vancouver Airport is a good example of a place that is bursting at its seams to accommodate everything and everybody who wants to be there. Eventually there will be a big new terminal building, but at present the existing terminal is a compact and friendly place. It has a small but efficient coffee shop on the ground floor, and it was here that this story really begins. Having been warned of the gastronomic rigours of my proposed economy-class steerage type of journey, I had ensured at least a reasonably full stomach for take-off. "Say, are you English?" said the girl behind the counter as I finished my coffee. "Well, for heaven's sake!"

As I listened to the first call over the loudspeaker (the aircraft was "now available for those wishing to board"), I wondered what economy-class would really be like. On my re-confirming at the C.P.A.L. office in Vancouver the previous day the clerk had asked where I wanted to sit—there was apparently some two-abreast seating as well as the triple threat I had expected, and so my request had been for an aisle seat in this two-abreast section.

The *Canadian Pacific New Jet-prop Britannia* brochure gave one idea of what the flight might be like. I would be flying in the largest, fastest, smoothest airliner in the sky today, it said. Wing-span was almost half the length of a football field and, if someone stood it on its tail—which, it said, was no easy matter at 180,000 lb—the jet-prop Britannia would be six stories high! Well, for heaven's sake, as my coffee-shop girl would have commented.

World's most relaxing way to travel!, the brochure went on. The Britannia was apparently built with my comfort in mind, the cabin was air-conditioned and perfectly pressurized, and of particular note was the unique system of humidity control. Why was it of particular note? Because it kept the air Springtime fresh and crystal clear.

Around me, the brochure continued, was a wealth of luxury, with decor that was in exquisite good taste. The windows were big, the carpets were thick. Reclining seats had all the comfort of my favourite armchair, and there was head, leg and elbow room to spare. In fact, the Britannia was unusually spacious.

Then the clerk had looked at me and said, "Have you travelled economy-class before, sir?" and had given me a much smaller leaflet entitled *A word about your economy-class flight*. . . . There had in fact been a couple of hundred words, and they seemed to have been printed in small, economy-class type.

Their message was that "some modification in passenger services" had been necessary to bring me these low economy-class fares. Tasty sandwiches would be served to me at mealtimes, and tea, coffee and milk would be available, but "Cigarettes and alcoholic beverages will not be available to you on board; we suggest you carry sufficient supplies of your favourite brands." Newspapers and magazines could not be distributed during the flight, but there was a news-stand in the airport waiting-room.

As I could appreciate (the leaflet philosophized), the thrift of C.P.A. economy fares made it possible for greater numbers of people to travel, and left me more money to spend at my destination.

They were right about greater numbers of people travelling, but they didn't tell me they would all be coming along with me on Flight 302 to Amsterdam. The second loudspeaker call mentioned "immediate departure," and we left the crowded hall, moved out over the apron, and boarded Britannia CF-CZC *Empress of Madrid*. The 44-seat economy-class cabin obviously hadn't yet been connected up to the Springtime Fresh and Crystal Clear air, in fact it was pretty Summertime Hot and Muggy as the occupants overloaded the overhead racks with coats, stored their supplies of favourite brands, and generally began to settle down for the long trip ahead. But presumably the first-class compartment at the rear of the aircraft would be hot and muggy also.

The next discrepancy was in the location of my seat. Having requested the aisle seat of a double row, I suppose one should not have been surprised at being awarded the centre seat of a triple row. This led to an interesting situation. In the aisle seat next to me was a Danish lady who was telling the steward that she had expected a window-seat. This, clearly, was my only chance to extricate myself from the three-seat sandwich. Would she care to accept my seat, which was nearer the window? Yes she would, with many thanks. Not at all.

With only one elbow now digging into my side, I reflected that I had won my first battle with the economy-class concept. What would be the next problem? I soon found out.

Just after we had taken off, my Danish neighbour leaned forward and began to put her handbag in the seat-back pouch in front of her. Suddenly, surprisingly, the seat-back jerked back with a thump and stopped about an inch from her nose—the passenger in front had reclined his seat. My own amusement

*"They were right about greater numbers of people travelling, but they didn't tell me they would all be coming along with me on Flight 302 to Amsterdam. . . ." Some of the travellers, seen (below, left) checking in at Vancouver, (heading picture) boarding "Empress of Madrid," and (below, right) in the economy-class cabin towards the end of the flight* "Flight" photographs

"Flight" photograph

*Crew-members at Amsterdam: Purser H. Soukop, Capt. A. Vanhee, Second Officer J. Robertson, First Officer N. Carey and C.P.A.L. Assistant Chief Navigator R. Little*

## THE ECONOMIST . . .

at this was erased with a second thump as the seat in front of me flew back in similar fashion.

This sudden abbreviation of the 34-inch spacing to which we were entitled obviously could not be tolerated. We pressed the buttons and reclined our seats. The realization dawned that this was the real essence of economy-class travel; we were simply a triple sandwich of rearward-sloping goldfish.

And now for the view. Looking from my aisle seat through the window, I gazed on the calm, sleek beauty of two Bristol Proteus cowlings sparkling in the sunlight. Every detail of the scene was clear; every Dzus fastener was correctly aligned. I am sure other passengers had an equally good view of Vancouver.

Although Canadian Pacific's northern-route flights from Vancouver to Amsterdam are usually staged through Sondrestrom, Greenland, the winds on this occasion were such that we had flight-planned to Goose Bay, and this first leg was expected to take 6 hr 40 min. I remembered a Notam pinned to the wall in the met. office where I had sat in on the pre-flight briefing. A man named Bolling was attempting a flight from Manila to Wichita at this time, and the Notam read: "All aircrews are alerted to the possible danger of an aircraft flying in these areas with pilot taking occasional naps . . ." I looked quickly out of the window. The cowlings were still in position.

The passengers were amusing themselves in various ways. The fact that we economists did not rate give-away literature was irrelevant; we had brought our own. As we approached the magnificent Rocky Mountains a woman sitting next to the window on the other side of the cabin opened her *Reader's Digest* and settled down to enjoy *The Day My Son Drowned*. Further forward, *Fielding's Travel Guide to Europe* rubbed elbows with *The Organization Man*, as a large man pointed his expensive-looking 16 mm cine camera towards a window ("I don't know anything *at all* about these things—I just bought it").

Two hours later tea was served, in the shape of open-top sandwiches dispensed by purser Harry Soukop from a trolley which he pushed up the aisle. Of course, I remembered, economy class meant sandwich-class. And what had a New York B.O.A.C. man said at the time of the big controversy as to what was and what was not a sandwich? Asked by the New York Press what ingredients the Corporation put into its sandwiches he had replied, "Oh, jam and that sort of thing, you know." Well, we had luncheon meat and tomatoes.

After tea, I gazed through the window once more at my two Proteus cowlings. Not that they meant I had no view of the ground. Far from it. By leaning forward, twisting my neck, and looking across to the other side and back one row, I could indeed see the scenery. There were mountains and at least one prairie.

Back in the economy-class cabin, passengers had realized they had not signed a contract not to move from their seats, and were now moving around and getting some exercise. A woman in front of me got up and walked back, barefoot. I examined the feet of the two men opposite me (well, it was a 5,000-mile trip—you try thinking of things to do) and was amazed to see that they, too, were shoeless. I was rapidly getting left behind in the gambits of economyclassmanship; this was obviously a useful and basic tip. But the tall chap's tartan socks were a bit much.

Meanwhile there was a lot of photography still going on—a keen-looking young man asked purser Soukop to take a picture of his row, which he did—and a dear little boy in the front row leaned suddenly over the back of his seat and shot a startled gentleman sitting behind with a brace of Lone Star Ranger six-shooters. Everything, in fact, was proceeding normally.

Much of the flight was in fact quite normal and quite routine. I cheated as far as being a typical passenger was concerned by spending some time up front in the crew compartment (how many of you passengers know that the most important item of navigational equipment on board a transatlantic Britannia is the pencil-sharpening machine mounted in a prominent position in the cockpit?) Captain of the aircraft was Capt. Achille Vanhee; first officer was Neil Carey and second officer Jack Robertson. The two navigators were Tony Grist and Bill McLean (I had flown with McLean over the same route by DC-6B two years previously), and assistant chief navigator Bob Little was riding as check navigator on this trip. The cabin crew comprised purser Soukop, steward B. Voehmer and stewardess Ann McDougall. Engineer Albert Fillingham and electrician Jack Duke, whose duties would normally be carried out at Amsterdam, completed the crew.

Between tea and supper most of the passengers in our compartment tried to get some sleeping time in, variously curled, sprawled and hunched in their seats—with the exception of the pistol-packing child in Row 1 who obviously had enough energy to keep going for a long time yet.

At 7.30 p.m. Vancouver time supper was served, with the assistance of a supernumerary stewardess disguised as a passenger who was following a spell on C.P.A.L.'s Canadian internal routes with a vacation trip to Europe. On the tray in front of me I identified egg slices, tomato slices, meat, cheese, radishes and a gherkin. Further investigation revealed, tucked away at the bottom of the plate and peeping coyly out from underneath the thick pile of goodies, a small thin corner of bread. It was a sandwich, after all.

During our 90-minute stop at Goose I was able to make good progress with a strikingly attractive blonde whom I had first noticed earlier on the aircraft. Completely bilingual, she had been acting as an interpreter for a middle-aged Swedish lady sitting next to her, but the thing that had attracted my attention was her poise and the calm gaze of her ice-blue eyes. She was the most captivating girl on board for my money—as, indeed, I was forced to confess later to my wife. In the waiting-room at Goose I enquired whether she was travelling alone. She was, and the provocative twinkle in her eye seemed brighter than before. As we boarded the aircraft again I was carried away with thoughts of what might have been—if only I, too, had been six years of age.

But yearning for my youth would obviously get me nowhere, and so on the seven-hour stretch from Goose to Amsterdam I settled down and tried to sleep. Sleeping economy-style, it transpired, was little different from trying to do the same tourist-class. I dozed awhile and then went up front again, but the crew seemed to have things fairly well under control.

About four hours out from Goose the economists began to wake up, stretch, wash and move around. We had switched our watches on by four hours to catch up with local time at the Labrador base, on which reckoning it was now about 7 a.m. This meant 11 a.m. in terms of local time at Amsterdam, but to purser Soukop it was simply time for breakfast.

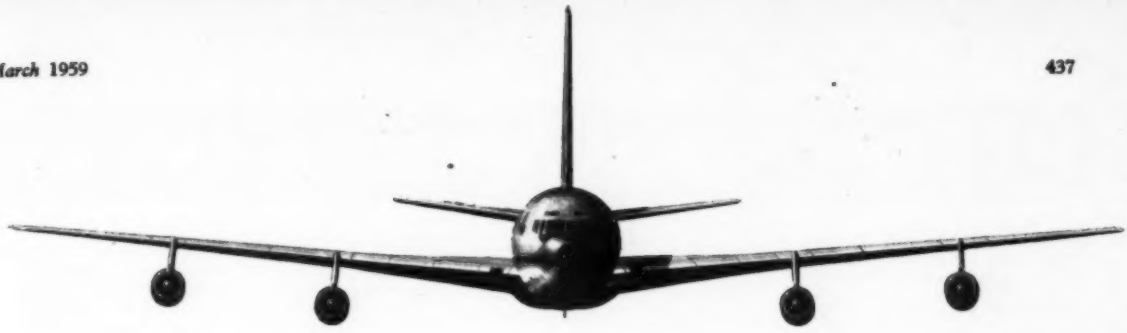
This meal—sorry, sandwich—proved intriguing. First came a standard ham, egg, tomato and cheese sandwich, served with coffee. Then appeared three slices of orange, jellied, on bread. This was, of course, the obvious answer—serve *a two-course sandwich* and keep both the passenger and I.A.T.A. happy.

Soon we saw the Irish coast ahead. Up front, Capt. Vanhee was finishing his breakfast, his spectacles clipped to a neat gold chain; navigator McLean was delightedly listening to the Irish accent of the Shannon radio operator. We were on the home straight now, and the Irish Sea and the Isle of Anglesey quickly passed beneath us. Most of North Wales was under cloud, but we caught glimpses of Rhyl and Prestatyn as we approached the coast. Ah well, travelling from Rhyl to London via Amsterdam would doubtless prove faster than a good many of the rail journeys I had experienced on the route via Crewe.

At 1.15 Harry Soukop began to distribute Delft china miniatures to the first-class passengers—who indeed deserved them, for they were paying some £85 more than we were for the one-way fare. The economy-class cabin looked rather the worse for wear. It had that worn, rumpled air that goes with slept-in suits, sandwich-loaded stomachs and unshaven jowls. At 2 p.m. precisely we touched down at Schiphol Airport.

This, then, was economy-class travel—not as indicated by curves on an airline expert's graph, not as advertised in the "cheap, cheap" song of the airline publicity birds, but simply the way it seemed to one of the passengers. What was it the small leaflet had said? *We hope that you will not be inconvenienced by these few adjustments in facilities, and will enjoy the most comfortable of journeys.*

Obviously it had not been "the most comfortable" of journeys. But we had enjoyed an adequately comfortable trip, and those who paid their own fares had £85 apiece in their pockets which the semi-reclining, bags-of-leg-room-and-Delft-china boys at the back did not have. Economy class seemed a Good Thing. We should probably travel as economists again; in fact we might not object too strenuously if a few more frills were cut out and fares were further reduced.



## BOEING 707-123

**(Four Pratt and Whitney JT3C-6)**

Span ... ... ... 130ft 10in

Length ... ... 134ft 6in

*American Airlines have long had a tradition that their aircraft should, in the main, be left in the original metallic finish; not for them the white-topped passenger cabins or slabs of colour on the vertical tail. The first jet transports operated by this big U.S. airline are painted with customary restraint: red flashes along the fuselage and pods and red panels on the elevators, rudder and low speed ailerons are outlined in white and contrast with the black lettering, company insignia, radar nose and pilot's anti-glare panel. The airline's flagship recently broke a commercial transport record for a scheduled westbound transcontinental flight with a time of 5hr 7min between Idlewild and Los Angeles.*

"Flight" copyright drawing by D. I. Punnett

# Straight and Level

MANY people, including the Supply Minister, seem to be rather vexed with B.E.A. for not having placed a firm order for the Rotodyne. It has been implied that an American airline (New York Airways), by placing the initial order for a British aircraft, has put B.E.A. to shame.

I feel a little unhappy about this. Surely B.E.A. should be free to buy equipment—British-made of course—which best suits their commercial needs? They should not be expected to buy the Rotodyne for any other reason, even if they have made optimistic noises about it.

For N.Y.A., who have flown helicopters on commercial operations every 45 minutes for nearly three years—as a 70 per cent-subsidized operation—the Rotodyne is a logical step forward away from subsidy.

B.E.A., on the other hand, are not scheduled helicopter operators—because the Government has not provided the necessary finance and encouragement. So in apparently scolding B.E.A. for not buying the Rotodyne, the Supply Minister is really criticizing his own Government's helicopter policy.

● Three weeks ago I suggested that R.A.E. apprentices might smarten themselves up a bit before stepping on-stage to receive their awards at the annual prizegiving ceremony. Last week we printed a letter from a keen R.A.E. lad who said in effect that Life was much too real, too earnest for that sort of thing—he and his fellow-apprentices were all too busy working on aircraft and in the workshops (it says here).

I have since received a letter from Mr. Lungley Powe, a director of the Hector Powe organization, expressing keen approval for my suggestion of a Hector Powe Award for the Apprentice Best Suited to the Occasion.

So now the ball is in the R.A.E. Technical College court. Will the Bacon-Powe attempt at elegance in apprenticeship succeed, or will Farnborough remain a sartorial limbo? Now, Mr. Peggs, what are your views as college principal?

● To those airlines having labour troubles I recommend the following from *Management Must Manage*,* by Sir Charles Boost, dynamic boss of Plummet Air Lines:—

"I was profoundly shocked when I heard that my airline had 13,000 too many stores assistants, 121,000 too many engineers, and 29 too many house magazine editors.

"How did things get to this state? Why had no one told me? My South of France villa has a telephone, and when I am aboard my yacht I am within easy hailing distance of the shore.

"I decided something must be done—and no messing about. I'd show 'em how I got my wartime nickname of 'Basher.' I'd show 'em. . . .

"So I decided. . . ."

But I must not spoil the climax of a fascinating book which, as a treatise on the treatment of labour trouble, is a classic.

● I must also recommend a new pamphlet *They Owe Us A Living*,† by Ted Chip ("Big Chip," as he is known to his employers). The author is shop steward of the Plummet joint council for rivet-hole drillers and allied operatives in the workers' sectional brotherhood panel of amalgamated engineering trades and electrical fitters. In his book Mr. Chip sets out the following "Airport Workers' Creed":—

(1) We believe that Plummet should be nationalized, like B.O.A.C., because the taxpayer has a duty to airport workers.

(2) We believe that the rank and file shou'd beware of betrayal by union leaders, who are mere management-bootlickers.

(3) We believe that the fight is *not* so much for a 35 shillings an hour rise, backdated to September 1, 1953, but that it is a fight for the upholding of working-class principles and the dignity of the trade union movement.

*British Air Power Publications Ltd., Imperial Aviation House, London, W.1, 25s.

†Solidarity Press, E.C.1, 6d.

● It struck me as a singular coincidence that, just having read Cyril Uwins' lecture on Frank Barnwell's aeroplanes (page 402) I should immediately pick up the current issue of *Aero Modeller* and open it at a double-spread drawing of the Bulldog—one of Barnwell's more famous and successful designs. But I felt some almost supernatural influence at work when I put that journal down, picked up the *American Modeler* and opened it at a three-view of Barnwell's Bristol Brownie.

Can you now believe that the latest *Model Aircraft* features Barnwell's Bristol M.1 series?

Equally amazing to my mind is the realization that in this year 1959 an American journal should see fit to interest its readers in an obscure British light aeroplane of 1924—when the same issue carries an advertisement for a "Space Taxi . . . four colors plastic. Ready now. $1.29."

● *"There was no tongue-in-cheek approach by British aviation industry trade journals when they announced the American Airlines' Electra accident at New York. The expressions of regret were sincere."*—from the American publication *Aviation Daily*, March 5.

Aviation protocol decrees that there shall be no gloating about other people's misfortunes, however much one may have suffered oneself. There are strict unwritten rules about this: it just isn't the form to make capital out of anything which concerns aviation safety—and that is that.

● This was why I felt decidedly unhappy that a British Airways Corporation, in recently opposing the application of a British independent airline to operate a new service, suggested that such a service would not be "in safe hands."

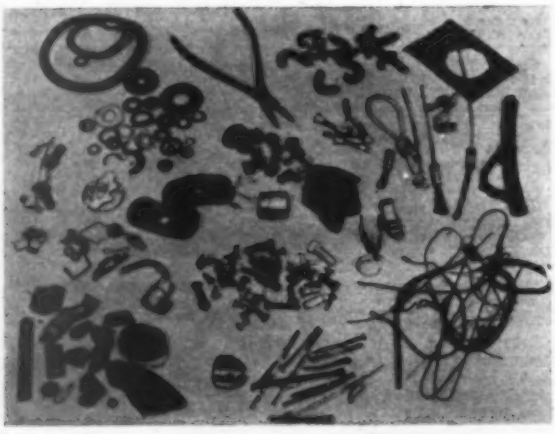
The independent concerned actually has a better accident record than the Corporation.

● Warranted genuine conversation, innocently overheard the other day:—

*Interested party (inspecting new transport aircraft):* "What, actually, are you going to sell the aeroplane *as*?"

*Sales manager (without turning a hair):* "Actually, we're going to sell it as married quarters to the Uruguayan Marine Corps."

ROGER BACON



One morning recently several hundred officers and men at a U.S.A.F. base lined up shoulder to shoulder to "sweep" their airfield. Here is a selection of the 2,000 lb. of debris they collected—a clean-up which, according to the Flight Safety Foundation, resulted in a 60 per cent reduction in jet engine changes. Moral: Buy airliners with high-mounted jet-engine intakes

# Super Broussard

## A PROMISING SHORT-FIELD TRANSPORT

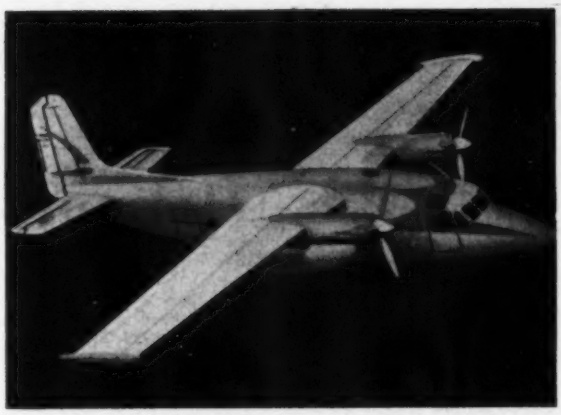
DURING the next few weeks the Max Holste MH.250 Super Broussard is to make its first flight. This French prototype will be powered by two Pratt & Whitney R-1340 engines giving 608 h.p. each and will represent the first result of Max Holste's efforts to produce a twin-engined bush transport and feederliner. Its arrival on the scene is significant in that the airframe has become available at a time when piston engines in the 500 to 1,000 h.p. range are becoming scarcer and a whole new series of turboprops is emerging.

The aircraft was in fact designed from the outset to accept any of these engines with the minimum modification. In order to make use of the greater power now available wing and tail-surface areas of future Super Broussards are to be slightly increased and the fuselage extended to accommodate an extra row of seats. In September a pair of Turboméca Bastans, giving 805 e.h.p. each, is to be delivered for the first turboprop Super Broussard, which is to be designated MH.260. An MH.270 is planned for two Bristol Siddeley P.182s (1,064 h.p.) and the MH.280 would have two Lycoming T53s giving 972 h.p. each. General Electric's T58, the de Havilland Gnome, the Blackburn A.129 (840 h.p.) and other engines could also be chosen.

Max Holste first achieved large orders with the excellent MH.152 Broussard powered by the redoubtable Pratt & Whitney Wasp. About 400 were ordered and of these 350 have been completed. Like the Broussard, the Super Broussard is based on a detailed study of the requirements of French and foreign operators and on extensive tours which Max Holste made in Africa to find out on the spot what was wanted. The aircraft has been designed to be cheap to make and simple to operate and to be capable of using small, semi-prepared strips. With a maximum capacity for 25 passengers and a cruising speed ranging between 196 and 207 m.p.h., according to the turboprops fitted, the Super Broussard may well provide the answer to some of the DC-3 replacement problems. It is smaller and simpler than aircraft of the Friendship class and nearer the STOL standard than such machines as the Dove and the Heron. It is also somewhat smaller than the D.H.C. Caribou. The first aircraft, state the makers, could be delivered fourteen months after placing of an order.

The MH.260 would cost about £65,000 and the MH.280 about £77,000. Holste would produce about a third of the airframe themselves, sub-contracting the remainder to Nord-Aviation, Sipa, Morane Saulnier and Hurel-Dubois. A freight version is also foreseen with a beaver-tail rear-loading ramp replacing the existing double doors. Extensive flaps and leading-edge slats should provide excellent short-field performance and the main undercarriage units, fitted with low-pressure tyres, retract hydraulically into bulges on the fuselage flanks. When retracted, the wheels protrude slightly from their housings to offer some protection in case of wheels-up landing.

With two Bastans the Super Broussard should carry twenty passengers over a 500-mile stage at 197 m.p.h. for 5.3 fr/km (about 2.4d/mile). With two Lycoming T53s the cruising speed would increase to 207 m.p.h. and the cost to 6 fr/km (about 2.7d/mile). In the first case the payload is 5,300 lb and in the second 6,600 lb.



*This model indicates the appearance of the new transport*

In order to allow for flight in tropical turbulence and operation from rugged terrain, the Super Broussard has been designed to meet CAR.4b specifications, but the proof load-factor has been increased from 2.5 to 4.

As for performance, the MH.260 at 17,000 lb gross weight has an accelerate-stop distance of 2,140ft and a balanced take-off length of 2,500ft. The normal take-off run, with flaps at 30 deg, is 655ft on a runway and 1,020ft on soft ground. It reaches 50ft in a total of 1,340ft. The MH.280 will take-off in 545ft and reach 50ft in 890ft. It will reach 9,800ft in 6 min 10 sec.

Despite the fact that the Super Broussard is designed for "outback" operations, considerable care has been taken to provide for airline standards of comfort. There are large circular windows, soundproofing and a baggage compartment, galley and toilet are included in the 17-passenger layout. For the carriage of freight a total cabin volume of 847 cu ft with a floor area of 129 sq ft is available with a roof height of 6ft 7in at the rear. Beneath the main spar this is reduced to 5ft 8in. The two-piece main door measures 4ft 8in × 4ft 10in. A limited pressurization system, weighing about 60 lb, will allow the cabin atmosphere to be kept at 9,200ft when flying at 14,800ft.

Folding seats for quick conversions could be provided. The 127 cu ft baggage compartment in the rear fuselage is accessible through a hatch in the starboard side.

Stability of the fuselage-mounted main undercarriage will be assisted by a torsion bar linking the two legs. Two 3 kW generators and a 28 V, 35 a.h. battery will produce electrical power; and radio, electrical and hydraulic equipment will be concentrated in a compartment immediately aft of the flight deck, so that they can be reached in flight if necessary. Each group of components will be mounted on independent frames to allow quick removal.

Considerable interest has already been shown in the Super Broussard, but the only French governmental support for it, in the present restricted circumstances, amounts to the cost of half the first prototype. The other half has been financed by Max Holste. The Super Broussard may well fill a real need in air transport and should be assured of an excellent future.

## A FILM ON DISC BRAKES

A NEW Dunlop film, entitled *The Power to Stop*, illustrates the development of disc brakes for motor vehicles. It begins by recording the first aircraft bag-type brake of 1932 and the reasons for its replacement by the disc brake in the latest aircraft. Aircraft now fitted with such brakes are suitably illustrated by *Flight* drawings. The film continues with an account of the development and testing, notably in Jaguar competition cars, which finally led to the incorporation of disc brakes as a standard feature in several production cars.

*The Power to Stop* (16 mm, monochrome, sound, 21 min) was produced by Ronald H. Riley in association with the Film Producers Guild. It is available on loan from the Dunlop Film Library at Wilton Crescent, Merton Park, London, S.W.19.

## AGRICULTURAL ACCESSORIES

FUNCTIONAL diagrams of installation and operation are included in a new brochure on the Sellars Swathmaster dusting and spraying equipment published by the manufacturers, Transland Aircraft, 2600 West 247th Street, Torrance, California. Also described is the company's new T55 combination liquid-dust hopper, designed especially for use with the Swathmaster.

## FORTHCOMING EVENTS

Mar. 27-30. Easter Gliding Rally, Long Mynd.
Mar. 30. Northamptonshire Aero Club and Tiger Club: Air Display, Sywell, Northampton.
April 1. Kronfeld Club: "Field Landings and Retrieving," by Lorne Welch.
April 3-5. Aslib Aeronautical Group: Annual Conference.
April 4. British Interplanetary Society: "Radio Astronomy in Navigation, Guidance and Communication," by C. M. Cade.
April 5-12. Tiger Club Aerobatic Training Week, Sywell.
April 6-9. R.E.C.M.F.: Radio and Electronic Components Show: Grosvenor House and Park Lane House, London.
April 9. R.Ae.S. (Main Lecture at Preston): "The Art of Developing Aero Engines," by A. C. Lovesey.
April 10. Helicopter Association: "French Helicopter Developments," by L. F. G. Legrand.
April 13. Institute of Transport: Brancker Memorial Lecture, "World Peace through Air Transportation," by Capt. E. V. Rickenbacker.
April 14. Institute of Metals: "Scientific Use of Space Exploration," by Prof. F. Hoyle.
April 15. Aircraft Recognition Society: a.g.m.
April 17. Institute of Navigation: "The Decca Trials," by Col. C. Powell.
April 21. R.Ae.S.: All-day Discussion on the Structural Effects of Kinetic Heating.
June 12-21. Paris Aero Show.
Sept. 7-13. S.B.A.C. Display and Exhibition, Farnborough.

# Westland's London Heliport

OVER the past ten years a considerable background of helicopter operating experience has been accumulated in this country and elsewhere. During 1954, for instance, the short-term operational activities of British European Airways at the London South Bank site stimulated considerable public interest and a measure of official support. In the United States and in Europe regular scheduled passenger services of an intensive nature are currently commonplace.

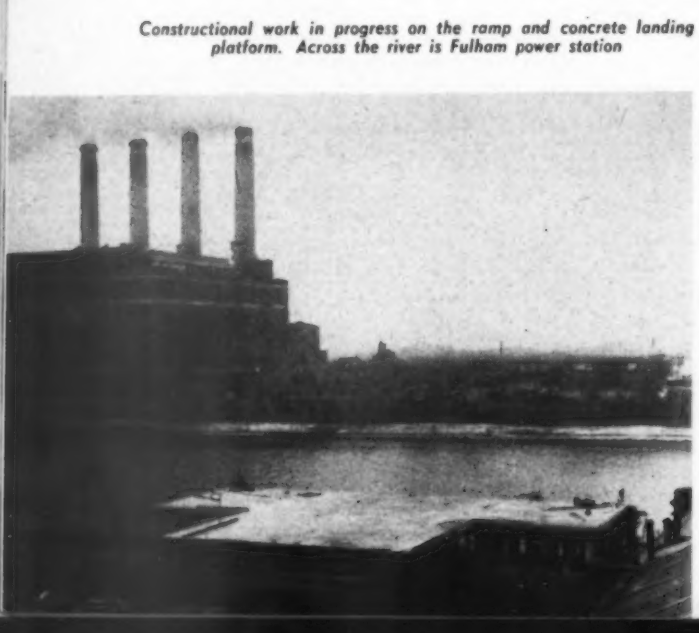
It was a general awareness within the British helicopter industry of the important and far-reaching implications of the rapidly approaching transition to multi-engined helicopters which led the Helicopter Association of Great Britain during 1957 to seek factual information on current and projected helicopter activities. Although charter operators had for some time been pressing their need for terminal heliport facilities within the inner London area, official circles had yet to be convinced that the helicopter had a future.

Following its investigations the Helicopter Association issued a widely circulated report† which confirmed the immediate need for such a heliport. As this failed to stimulate official support, the initiative was taken by Westland Aircraft, the largest constructors of helicopters in Europe, to undertake the entire sponsorship and financial responsibility for the construction of London's first heliport, and the first to be specifically designed for such a rôle in this country. The scheme officially proposed was for a combined land and water heliport, and as this met with an encouraging response from both the Ministry of Transport and Civil Aviation and the Port of London Authority, a small riverside site was acquired, and detailed plans were put in hand to make it operationally acceptable to all parties.

London is bisected in an east/west direction by the River Thames, and the 200ft square area of land selected for part of the Westland London Heliport is located on the south bank at Battersea. Lying between Battersea railway bridge and Wandsworth bridge, it is 3½ miles distant from Hyde Park Corner. Following a public inquiry held last May, when planning consent was given by the Minister of Housing and Local Government, construction of the heliport began in August. It will shortly open for operational use.

With its T-shaped design determined by the equally important considerations of operational necessity and economic reasonableness, the platform chosen consists of a 21in-thick heavy reinforced concrete slab supported by pre-stressed concrete and steel piles vertically driven into the river bed. The rectangular head forming the landing and take-off pad has its major axis parallel to the shore-line and is 125ft long by 53ft wide. Connection with the 50ft-distant river boundary flood wall is by a 65ft-wide stem.

*Constructional work in progress on the ramp and concrete landing platform. Across the river is Fulham power station*



The upper screeded surface of the platform is 6ft above the river normal high-tide level at spring tides. An approximate differential of 18ft between normal high- and low-tide levels at spring tides necessitated provision of a slipway to facilitate launching a river rescue boat, an obligatory safety requirement.

Towards the northern downstream corner of the parking area, in line with the main entrance gate, are two separate buildings connected by a short covered gangway. The first and largest, of single-storey construction, is for passengers and helicopter staff. The second, of two storey design, provides a store at ground level, with a radio control centre above it. The control room, to which an external staircase provides access, accommodates an air traffic control officer and such radio communication and navigational aids as will enable him to supervise the orderly arrival and departure of helicopter traffic.

Two underground storage tanks, of 5,000 and 3,000 gallons capacity provide bulk storage for gas-turbine and piston-engine fuels respectively. Supplied by Shell-Mex and BP Ltd., this refuelling installation is located adjacent to the upstream or southern edge of the parking area ramp. Replenishment of the underground tanks is either through manhole-enclosed filler pipes directly above, or alternatively from offset filler points located just off the downstream edge of the ramp.

By W/C. R. A. C. BRIE, A.F.R.Ae.S., A.F.I.Ae.S.*

Following discussion with representatives of the M.T.C.A. and London Fire Brigade Headquarters, the policy agreed for the main fire fighting source was to rely upon a mains water supply fed to a twin-branch hydrant and two 75ft lengths of hose, located adjacent to the downstream junction of the ramp and river wall. Used in conjunction with foam producing equipment and a booster pump, the rate of flow is 475 gal/min at a pressure of 80 lb/sq in. Other emergency equipment will include an R.F.D. "Zodiac" rescue boat capable of carrying ten people.

Design of the electrical installations covering immediate and longer-term lighting and power requirements has been undertaken by the General Electric Co. Ltd. To ensure safe ground movement of helicopters, vehicles, and personnel at night, the main illumination is provided by four 1 kW sodium floodlights mounted as a group on a 40ft-high tripole mast.

Whilst all of the obstruction-free part of the parking area is available for ground manœuvring, helicopter parking is normally limited to the upstream or southern half, thus leaving the ramp area clear for positional towing and refuelling. With large helicopters such as the Westminster however, occasional encroachment of the downstream portion cannot be avoided. There is sufficient open parking space comfortably to accommodate up to five eight-seater helicopters. This number can be increased if the rotor blades are folded.

Constructional design of the reinforced concrete landing platform at the Westland Heliport is based on the maximum impact loading to be anticipated from a helicopter (such as the Westminster) weighing 15 tons, making a symmetrical landing on its two main wheels simultaneously at an impact velocity of 10ft/sec. This landing condition produces maximum concentrated loading and is the design case for landing platforms and the like. In this particular instance the dynamic load factor is 2.0.

Noise and its suppression to a tolerable level is a major problem with helicopter operation in a populated area. Although the industrial buildings on three sides of the heliport provide a muffler effect during low-altitude manœuvres, it was decided during the early planning stage to make sound recordings of a typical helicopter during a series of approaches, low hoverings and climbs at the proposed platform location. These technically supervised recordings show that the degree by which the general noise level was exceeded at four pick-up points in the nearest residential area about 500ft distant was negligible and of minimum duration. General traffic noise level by day on the nearest main road was found to be of the order of 75 to 85 decibels.

Although helicopters can be flown by night they cannot at present do so with adequate safety over a populated area. Hence for the time being flight operations at the heliport will be restricted to the hours of daylight.

**Conclusion.** Westland Aircraft are manufacturers, not operators, of helicopters. In the present instance it was felt necessary to take steps to provide a heliport, as there seemed to be no official project. Since these plans were announced however, there has been quite a lot of parallel activity. The creation of this

(*Concluded on page 446*)

**This is an abridged version of a study by W/C. Brie, well known as a pioneer helicopter pilot and as an authority on the technical aspects of helicopter operation.*

*†"Examination of the Case for a London Heliport," The Helicopter Association of Great Britain, January 1958.*

# Correspondence

*The Editor of "Flight" is not necessarily in agreement with the views expressed by correspondents in these columns. Names and addresses of writers, not for publication in detail, must in all cases accompany letters.*

## Difficulties of the Independents

OVER the past ten or so years the independent operators have largely built up their businesses on trooping and on inclusive-tour flying.

The R.A.F. are increasing their share of trooping at an ever-increasing rate and we now learn that B.E.A. are to enter the field of inclusive tours. Let us be fair: the independents would like the lucrative scheduled routes now flown by B.E.A., yet no one suggests that the Corporation should be required to forgo them. Similarly, why should B.E.A. muscle-in on what has become accepted as the independents' "bread and butter"? After all, the independents pioneered this field when all else was denied them.

The directors of many independent companies are in a dilemma. They want new aircraft and they can raise the purchase money; but if they re-equip, will there be enough work to justify this step? Some sort of assurance must be given if they are to be competitive in the world's charter market. Without it more experienced and skilled employees (I include aircrew, engineers and commercial sections) will be laid off and lost to aviation.

Let us, then, have a clear statement of air transport policy and with it a tangible acknowledgement of the part to be played by the independent companies.

Dymchurch, Kent. R. K. SELF.

## Conservatism in the Cockpit

AS an ex-aircraft draughtsman (now working on missiles) with a small amount of flying experience I should like to comment on Cdr. Goodhart's criticisms of present-day cockpit layouts (*Flight*, December 26). The commander is quite right up to the point that the man in the cockpit has a much clearer view of requirements than has the man at the drawing-board. The pilot has the hardware in front of him and the designer has to visualize all the problems in advance. From here on, however, several arguments can be raised on both sides on the subject of "Was Wilbur right or do we have our controls crossed?"

The best method of rudder control would be the use of a control wheel. When control of the rudder is by hand in this way it is better to act in the natural sense as in the case of a bicycle or motor car. Having decided, however—as the early aviators presumably did—that the pilot's hands had enough to do in controlling pitch and roll, I think that the right-foot, right-turn method presents less of a psychological problem to a pupil than would the need to remember "right foot, left turn" and *vice versa*. The right foot and left stick movement is an awkward one to execute.

The next point is the location of the control column. Certainly in large aircraft the column or wheel is bulky and obstructs both the pilot's view of the instruments and access to the seat; but this argument does not apply to small machines, which usually have a relatively small "stick." On the smaller types there is no arm-rest on which to mount a control handle, while on the larger aircraft the arm-rests have to fold for ease of access to the seat—installation of an arm-rest control would therefore be a difficult problem except in the case of electrically powered controls. Furthermore, I believe that most pupils would find it easier to learn to fly with the control handle mounted directly in front of them rather than at one side.

Another possible solution is to replace the control column by a handle protruding from the instrument panel and having fore-and-aft movement for pitch control, lateral movement for rolling and torsional movement for turning. One basic disadvantage common to both this method and the arm-rest handle, however, is that wrist movement is coarser than a full arm movement, due to the shorter working-arm on the pilot and the stick.

As for the instrument panel, it is vertical not because (as suggested) it is easier that way, but because it takes up less space than a sloping panel. Carrying the argument for sloping panels to its logical conclusion, the panels would need to be arranged in an arc around the pilot and this would prevent the use of a common control panel for both captain and co-pilot. An interesting point is why, with the introduction of covered fuselages, the instrument panel was not sloped to obtain daylight instrument illumination. The answer to this may be that the panel lighting might be a distraction at night, the daytime inconvenience of a vertical panel being less dangerous. A further solution would be to have a vertical panel with sloping instruments, but this layout might mean that some instruments were obscured by others, and would be dangerous as a source of injury in the event or a crash landing. Finally, a vertical panel mounted in the shadow of the coaming with luminous or dimly lit dials avoids difficulties caused by shadows and reflected light which a sloping panel would involve.

On the question of left-hand circuits, it does appear wrong to have the pilot on the left when one aircraft gives way to another on its starboard side. Let us take this question from the beginning, however, when we had a single pilot located centrally. This was followed by tandem seating, in which layout (with the pilots still seated centrally) it made no difference whether circuits were left-handed or right-handed. The decision to make circuits left-handed may have been followed on the introduction of side-by-side seating, by the ruling that the pilot's view during the circuit and landing was more important than that during the *en route* phase of the flight, when the second pilot could assist if necessary. The choice of left-hand circuits may well have been made because a left turn is often regarded as a "natural" turn for right-handed pilots. To alter the present state of affairs now would mean changing the first pilot over to the right and making all circuits right-handed, involving considerable instrument and control changes in many existing aircraft and the re-training of all pilots. It may be that, in less time than it would take to effect these changes, transport aircraft pilots will be relying entirely on radar for mid-air collision warning.

In conclusion I must agree with Cdr. Goodhart that designers do not do enough piloting to appreciate fully many of the problems involved. But even a chief designer must follow international standards laid down by official bodies, and it is surely the responsibility of the airlines and ministries who order the aircraft, aided by the pilots' associations, to decide whether the present standards should be altered.

This is not an attempt to pass on the responsibility for what are basically design matters, but requirements are constantly changing and so are conditions in the cockpit. The designer has usually several points to consider in each detail of the design, a fact not always appreciated by his critics, and a design therefore is a compromise between the various factors involved. At this point we should remember that the first designers were also the leading pilots of their day and their decisions were made under less severe conditions. So please don't shoot the pianist—the piano may need tuning.

Stevenage, Herts. J. ANDREWS.

## Flight-deck Layout

IT was with great pleasure that I read Mr. H. T. Thompson's letter under the above heading in *Flight* of February 20. Though he did not state his qualifications, I sincerely hope this is a case of at least one pilot adopting a sensible point of view.

The increased complications introduced by larger and faster airliners *do not* call for more pilots in the cockpit, but rather for a skilled crew of specialists in the respective fields of piloting, navigation, engineering and communications, under the command of one experienced captain, who, like the captain of a ship, would not be expected to perform any specific duty, but who would have the experience and qualifications to supervise the entire crew, and take over any function in an emergency.

I, too, look forward to "rationalization" in the cockpit, and in the aviation industry as a whole, replacing the exaggerated influences exerted today by national pride and individual trade unions flouting international agreements; and, like Mr. Thompson, I hope to be of some service in this respect.

Richmond, Surrey. A. SEGALL,
Technical Representative, Europe,
International Airline Navigators Council.

## Everest by Sailplane?

THE first people to fly over Everest or to climb it were British, and it would be appropriate if British pilots were the first to soar over Everest in sailplanes.

The techniques of mountain soaring are well known and have enabled long and high flights to be made over the Alps; the major problems are purely financial and political. It is doubtful whether any worthwhile scientific purpose would be served by such an expedition, and as a purely recreational proposition it is hardly worth the effort and expense; considering it as a question of national prestige, however, some attempt to organize the project could be made if sufficient financial support were forthcoming.

Marlow, Bucks. B. JAMES.

## Club Training for Commercial Pilots

WITH reference to your article "Club Training for Commercial Pilots" (March 6), I should like to make two points about the impressions given by the author of the article.

The first is that the Elstree students come to Ealing for instruction in the identification of marine lights. They do not, as he suggests, come here to listen to recorded R/T. conversations.

The second is that Captain Brook Williams is employed by Avigation Ltd.; only part of his duties is to attend Elstree as required for the ground instruction in navigation.

London, W.5. W. V. CANTON,
Principal, Avigation Ltd.

# THE INDUSTRY

## Buoyancy at Weybridge

THERE was a splendid unpompousness about the Vickers-Armstrongs (Aircraft) Ltd. speech day and presentation of awards to apprentices at Weybridge on March 17. With Sir George Edwards' dry witticisms, Maj-Gen. Sir Charles Dunphie's geniality, and a bright list of academic successes to report, all the ingredients combined to make the event just what these occasions should be but so often are not. Moreover, all the speakers seemed to have the same underlying thought, that the fact of difficult conditions in the aircraft industry should be a stimulus rather than a cause for depression.

Sir George himself set this note when he said that because things were more competitive than they had ever been before there was more need for quality, standards were more important and so was the effort put in by the engineers and designers; and the managing director must subsequently have been glad to hear his education officer, Mr. E. G. Barber, say that the company's academic results had been better this year (August 1957 to July 1958) than they had ever been before. For example, 15 university degrees had been gained against six in the previous annual period, and 12 Higher National Diplomas compared with eight. This despite a reduction in apprentice intake decided on as a compromise between the Carr Report (which advocated more training) and the Defence White Paper, which envisaged a 40 per cent shrinkage in the aircraft industry.

In an encouraging word about the future the technical director, Mr. H. H. Gardner, said that as things got more difficult each year they also became more exciting: last year, people were wondering whether there would be any more manned aircraft; this year, they are wondering who is going to design them. The same buoyant attitude was exemplified too by Sir Charles Dunphie, who is chairman and managing director of Vickers-Armstrongs Ltd. He proffered three pieces of advice to the apprentices: whatever your job, give it a hundred per cent; if you have a chance of trying a new one, it's right to have a go; and loyalty is the best quality.

Sir Charles had presented the Weeks Trophy (for the year's outstanding apprentice) to R. M. W. Manning; and in turn he was presented himself—by apprentice Neville Brenchley—with a handsome Weybridge-made ashtray as a memento of the occasion.

## D. L. Brown Joins Smiths

ONE of the few men who can claim to have flown both the Avro 504K and the Hawker Hunter is Mr. D. L. Brown, M.I.Mech.E., A.M.I.C.E., M.I.Gas.E., A.F.R.Ae.S., who has been appointed deputy manager of Smiths Aviation Division research department at Cheltenham. He joins Smiths from the School of Gas Turbine Technology, of which he was Principal.

*Mr. Brown*

Mr. Brown learned to fly in 1931 and in 1938-39 was hon. secretary of Eastbourne Flying Club. His early career was in gas engineering; he entered the aircraft industry in 1942, as a member of the design staff of Miles Aircraft. He had a share in the design of the Miles Libellula tandem-wing research aircraft and, as an M.A.P.-approved test pilot, also flew it. He also worked in close collaboration with Sir Frank Whittle on the powering of the Miles M.52 supersonic project. After the war Mr. Brown became training administration officer of British South American Airways, and in 1949 joined Power Jets (Research & Development) Ltd. to take charge of their School of Gas Turbine Technology.

## Steel—from Furnace to Service

TWO sound-and-colour 16 mm cine films, each both informative and dramatic in its particular way, have been produced by the photographic section of the Thos. Firth & John Brown research laboratories. One (running 33 min) records a tour of the company's 80-acre plant, showing methods of steel production for the aviation and other industries; and the other (15 min), made at the 1958 S.B.A.C. Display, gives action impressions of modern British aircraft, including many in which Firth-Brown steels are used. Both films are available on loan (the works picture with alternative commentaries in English, French and Spanish) to responsible organizations on application to The Sales Promotion Department, Thos. Firth & John Brown Ltd., Atlas Works, Sheffield 4.

*One of the new 28/112-volt aircraft starting and servicing units recently exported to Portugal by Red Devon Ltd., of Totnes, Devon. Peak outputs are 2,000 amp at 28v and 800 amp at 112v. The units are self-propelled but can equally well be towed by a tractor*

## West African Representation

KNOWN as Air Stock West Africa Ltd., a company has been formed to represent a number of aircraft and ancillary product manufacturers in Nigeria and the Cameroons, Ghana, Sierra Leone and Gambia.

*Mr. McCarthy-Jones*

Among the firms with whom agency agreements have been concluded, state ASWA, are Piper Aircraft Corporation, and Vickers-Armstrongs (Aircraft) Ltd.

The managing director of the new company is Mr. C. G. McCarthy-Jones, O.B.E., A.F.C., who is now resident at their office in Lagos, Nigeria. He was previously sales manager of Air Trainers Link Ltd. After a distinguished war record in Fighter and Training Commands and Army Co-operation units, he joined No. 601 (County of London) Squadron, R.Aux.A.F., and was its commanding officer for four years.

## IN BRIEF

Mr. B. T. Scott, until recently sales engineer with Kestner Evaporator & Engineering Co. Ltd., has joined Miles Structural Plastics Ltd. as sales development engineer.

* * *

The Sandwell Casting Co. of West Bromwich, Birmingham, recently opened a new £60,000 electronic controlled non-ferrous alloy foundry. Production in the new premises is very highly mechanized.

* * *

Mr. D. W. Hawkins, a former director and general manager of Dunlop Plantations Ltd., has been appointed to the main board of the Dunlop Rubber Co. Ltd. Mr. Hawkins, who joined Dunlop in 1927, has been controller of the Materials Supply Division for the past year.

* * *

Known as DB Toolform, a range of ready-mixed plastics for tooling purposes has been introduced by the Kenilworth Manufacturing Co. of West Drayton, Middlesex. Each of the several grades, which are supplied colour-coded for easy identification, is designed for a specific purpose.

* * *

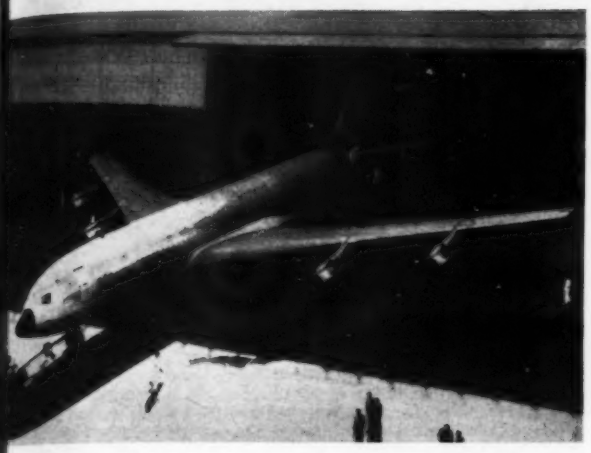
For limited distribution to airline operators and aircraft manufacturers, Westway Models Ltd., of 178 Brent Crescent, London, N.W.10, have produced an attractive loose-leaf folder illustrating some 30 typical aircraft scale models (for display, presentation and other purposes) from the many hundreds they have produced for the industry over the past few years.

* * *

Some changes have been announced in the public relations organization of the Hunting Group. G/C. A. H. S. Lucas has been appointed P.R.O. to Hunting Aircraft Ltd. and its subsidiaries at Luton; Mr. David Bolton takes up a similar post with Hunting Clan Air Transport Ltd. at London Airport; and Mr. David Bett continues at the Group headquarters in London. Mr. Hugh Scanlan has left to take up an appointment with Shell.

* * *

A new brochure from Coseley Buildings Ltd., Lanesfield, Wolverhampton, gives detailed data on the portal-frame buildings in which this firm specializes. Colour illustrations serve to emphasize a number of points, including the fact that the buildings can be given an attractive exterior finish by the use of Colourglaze asbestos cement sheeting. Aviation users of Coseley buildings include de Havilland Propellers, Fairey Aviation, Vickers-Armstrongs, Rolls-Royce and the R.C.A.F.



*It seems likely that B.O.A.C. will receive their first Boeing 707-420 ahead of the December 1959 schedule: here it is, Rolls-Royce Conways installed, rolling out of the Seattle plant earlier this month. A.R.B. certification flight tests will now begin*

# AIR COMMERCE

## KIRTLESIDE DECADE

LORD DOUGLAS OF KIRTLESIDE, chairman of British European Airways, was presented on March 19 with a B.E.A. ten-year badge. Presentation was made by the chief executive, Mr. Anthony Milward, at a small private dinner party attended by members of the Board and a number of chiefs of B.E.A. departments. He was presented also with a black crocodile-leather cigar case bearing a coronet and the initial "D" in gold.

Lord Douglas holds the endurance record for the chairmanship of either Airways Corporation and, with the one exception of Lord Citrine, he also holds the record for chairmanship of any British nationalized industry.

He entered the airline business in 1919 as an airline captain on the London - Paris, London - Brussels routes and was holder of British commercial pilot's licence No. 4. Appointed to the Board of B.O.A.C. in 1948, he became chairman of B.E.A. on March 14, 1949.

In 1949-50, his first year with B.E.A., the Corporation carried about 750,000 passengers, and reduced its loss over the previous year by about £1¼m. In 1957-58 B.E.A. carried about 2,765,000 passengers, and made a profit of more than £1m.

## PRICE OF THE ARGOSY

THE makers of the AW.650 Argosy, Sir W. G. Armstrong Whitworth Aircraft, have never announced for publication a figure for the first cost of their new transport; but, as suggested on these pages on May 30 last, it is around the £500,000 mark.

Mr. George Giles, president of Riddle Airlines, says that the cost of the four aircraft which he has provisionally ordered will be $1.5 million (£535,000) each, including U.S. import duty. He reports that the terms offered by A.W.A. are a 10 per cent down-payment and no payments until the second year, then over six years.

Riddle hope to receive the route-proving demonstrator—on whose performance the final order will depend—some time in October. It will be operated for a period of three to six months.

## B.E.A.'s "V.L.F." EXPERIENCE

IT will be recalled that last November B.E.A. introduced, as a special offer for winter months, an eight-day excursion fare 40 to 42 per cent below normal levels for weekend travel on the London - Glasgow/Edinburgh and London - Belfast domestic routes. The response to these very low fares has been considerable; and the results are obviously of interest at this particular time, when the A.T.A.C. is about to consider the applications to operate very-low-fare services by Eagle, Hunting-Clan and Airwork.

During the period November 1-February 28, weekday (i.e., standard-fare) traffic on these routes increased by 12 per cent, compared with the same period in 1957. By contrast, weekend traffic—when the special eight-day excursions were available—rose by 45 per cent. The proportions of the weekend traffic which went the cheap way were as follows: to Glasgow, 40 per cent; to Belfast, 50 per cent.

No overall load-factor figure was available last week, but experience on one typical weekend (November 22-23) was that, on the London - Glasgow/Edinburgh route, L.F. was 73 per cent compared with 53 per cent during the corresponding weekend in 1957. Similar load factor for the London - Belfast route was 80 per cent compared with 53 per cent.

But for more severe winter weather than in 1957, say B.E.A., the response would probably have been even better.

## HONG KONG BARGAINING-POINT

LAST week T.W.A. repeated their long-standing request to the Civil Aeronautics Board for permission to add Hong Kong to their route-network.

American carriers with C.A.B. permits to operate into Hong Kong are Pan American and Northwest. But it is one thing to have a C.A.B. permit; it is another to get U.K. approval. So far, only Pan American have been granted traffic rights by the U.K. Northwest, to their chagrin, have not.

Probably at the root of Northwest's objections to B.O.A.C.'s inclusion of Tokyo in the forthcoming round-the-world service (see p. 376 last week) is Northwest's demand for Hong Kong traffic rights. The C.A.B. could, of course, quite easily say to the British: "Unless you allow Northwest into Hong Kong we will not let you include Tokyo in your round-the-world service to San Francisco."

But the C.A.B.-baiters might note that this Board recently disallowed the conclusion of a management contract between Northwest and Thai Airways—which was a Northwest bid to gain the Hong Kong rights which Thai enjoys. The C.A.B. forbade this as poaching—upholding, in fact, the British Government's objections.

If Northwest are unlikely to get Hong Kong rights, it would seem that T.W.A.'s chances are even more remote. The China-coast Crown Colony is Britain's strongest bargaining counter in the Far East—stronger even than Singapore, where K.L.M.'s rights have finally been reduced, to the bitter resentment of that airline (see next page).

## THE THREEPENNY AIRLINE

OUR leading article last week quoted an American as saying that what America needed was a "five-cent air freighter." He was mildly plagiarizing C. R. Smith of American Airlines, who years ago spoke of the need for "a three-cent airline"—i.e., one whose fare-level was three cents per passenger mile.

So far this rate has eluded permanent capture by scheduled operators. Earlier this month, however, National Airlines sought the C.A.B.'s permission for a 25 per cent discount for off-peak, mid-week, night tourist travel. The publication *Aviation Daily* considers that the application is likely to be granted; it certainly appears to conform to C.A.B. policy. The C.A.B. propounded, when it agreed to eliminate domestic discounts last October, that this was done "with the expectation that the carriers will develop and submit to the C.A.B. in the interim new fares designed to promote additional traffic."

The proposed National rates are slightly more than 3 cents per passenger mile, compared with average coach—i.e., tourist—fares of 4.5 cents per passenger mile.

## TROUBLE IN BRAZIL

THE Brazilian airline industry is reported to be undergoing a severe financial crisis. . A survey by a Government committee under Brig. Dario Azambuja, director of the Department of Civil Aeronautics, has resulted in a report which, though secret, is said by a correspondent to recommend that, because Brazil has too many commercial transports, (1) excess equipment should be sold abroad and (2) Brazil should be divided into three operational zones for distribution among the airlines (Panair, Lloyd Aereo, REAL, VASP, Cruzeiro, Varig).

The report is said to recommend that the long-range jets on order should be used only on routes linking Brazil to the U.S.A. and Europe, and that existing aircraft should be used on routes to South America and domestic routes. This would suggest a cancellation of Varig's Caravelle order.

There have been steady increases in fares in Brazil (the latest *A.B.C. World Airways Guide* editorial says: "Yet again we have to report an increase in Brazilian fares"). The effect of these increases has been to cause a decline in domestic passenger traffic amounting to (according to some reports) as much as 60 per cent on some routes.

All this must be rather disturbing to those who imagine Brazil—the biggest country in South America—as the biggest market for the world's forthcoming surplus of piston engine airliners. In fact, it appears to have a surplus of its own.

AIR COMMERCE . . .

# THE HINGE OF HISTORY

**The wisdom of the controversial decision to standardize VOR/DMET as the international short-range navigation aid must be left to history to decide. This article reviews the special I.C.A.O. meeting at which the American aid was recommended in preference to the British area-coverage system.**

*G/C. J. B. Veal, pictured here with some of his delegation, represented the United Kingdom at the special I.C.A.O. meeting on the short-range navigational aids*

HOW will the world of 1975 look back on the recent COM/OPS/RAC meeting of I.C.A.O., convened to decide upon an international short-range navigation aid? At the best, it would seem, with disfavour: for the world's two leading air transport Powers clashed bitterly over their rival aids and reached a doubtfully honest and far from unanimous decision on which one to adopt.

Thirty-seven States attended at Montreal, and one other State, I.A.T.A. and I.F.A.L.P.A. sent observers. The meeting was chaired by Mr. J. W. Stone of Australia and the agenda was divided into three major parts: (1, 1) Determination of the precise nature of existing and expected problems in the various operational environments that involve the use of short-distance navaids; (1, 2) consideration of possible solutions in operational terms; (2, 1) development of quantitative and qualitative requirements to meet the operational solutions; (2, 2) review of the capabilities of existing and proposed short-distance navaids and their relative availability; (3, 1) recommended practices and guidance material for short-distance navaids; (3, 2) recommendations in relation to other elements in the air navigation system.

To cover this agenda, the meeting divided into two sections, committee A to tackle the comprehensive list of operational problems and their solutions (agenda items 1 1, 1, 2 and 2, 1) and committee B to examine the aids in question (item 2, 2) against the recommendations of committee A, which was also to tackle item 3, 2.

The committees worked in closed session, but there were altogether nine plenary sessions, one of which was devoted to a paper by Mr. B. Denicke on a U.S. Hyperbolic Navigation System test programme (New York Airways' experiences of Decca) and another to one by Capt. W. M. Masland (PanAm) of I.F.A.L.P.A. on operational aspects of the problem of short-distance aids. Working papers on various aspects of the subject were submitted by both U.K. and U.S. delegates before and during the meeting.

No real difficulty was experienced by committee A in reaching agreement on item 1, 1. This was an elaboration of the basic problem, described as "that of providing a system of short-distance radio navigation aids which is capable of meeting most practically and economically the requirements of users both on the ground and in the air under a wide variety of environment conditions."

But in the two succeeding items the committee ran into difficulties. Although the meeting was intended to view the requirements objectively, the U.K. and U.S. delegations (each regarding every requirement in the light of its own particular navigational aid) reached an *impasse*. Following a Canadian proposal, a two-country U.K.-U.S. working party was formed to try to thrash out the points of disagreement, and where necessary, "to agree to disagree." This resulted in the development of what were called "operational considerations applicable to the solution of the problem described under agenda item 1, 1. With some additions, these were adopted as a statement of system requirements. (They were later described privately as "the woolliest ever produced by an international organization.")

But on four points the two delegations could not agree. These were: (1) integration with precision aids for approach and landing and with long-distance aids; (2) the extent to which the short-distance aid should provide coverage with respect to altitude; (3) the extent to which the aid should provide assistance in the instrument let-down service and (4) the characteristics of the system respecting air calibration requirements. They were subsequently settled by vote, as was the question of whether specific accuracy tolerances should be defined or not. On the latter point the wording of the resolution adopted was extremely vague: "the accuracy required should be the highest attainable that was compatible with attainment of other important characteristics."

Although, ideally, committee B should have had available the results of committee A's work before reviewing the capabilities of the available aids, to save time B set about developing a detailed side-by-side comparison of the performance characteristics of Decca and VOR/DMET. Very slow progress was at first made in the detailed study of each delegation's technical working papers, and a new procedure was eventually adopted whereby delegates could query points but could not enter into protracted discussion.

In this way, committee B compiled Appendix A to the report of the meeting: the characteristics of short-distance navigation aids presented by States for international standardization. This work should not be underrated; it was a most comprehensive comparative examination under 29 headings of the capabilities, stand-by arrangements and costs of Decca and VOR/DMET. In view of what was said or implied elsewhere during the meeting, it is of interest that under the heading of reliability (a score on which Decca was sharply attacked), the U.K. delegation had this to say: "Earlier marks of Decca equipment used singly showed percentage serviceability varying from 90 to 97 per cent. . . . On the evaluation Comet, no receiver faults and only two minor faults have occurred in 98 hr. In the trials of Decca/Dectra by S.A.S., the failure rate was 11.6 per 1,000 hr. . . . In the U.K. unscheduled interruptions of services from Decca chains are of the order of a few minutes each year." Figures were not quoted for VOR/DMET, but it was stated that reliability is "far less important than fail-safe operation."

While system characteristics were being studied in committee, the struggle continued in open session and through the media of working papers. In particular, a paper damaging to Decca on the scores of reliability and accuracy was read by the F.A.A. official in charge of the New York Decca-Bendix helicopter evaluation programme. In particular, a serviceability figure of only 83 per cent was given. G/C. J. B. Veal, leader of the U.K. delegation, afterwards pointed out that the accuracy figures quoted were "spreads," and not 95 per cent probability figures—as commonly accepted by I.C.A.O.—and that, as far as reliability was concerned, the evaluation programme was only just beginning. The fact was that it was often impossible to service equipment once the day's work had started, and hence a fault on the first flight of the day meant that every subsequent flight was marked against Decca.

Another attack on the British equipment was made by I.A.T.A.; the association's representative, Mr. Besson, was quoted as saying that Decca provided no information from 30 to 40 per cent of the time, 30 per cent of the time clear information was provided and during another 30 per cent partial information was provided. This was followed by a statement in plenary session that "misunderstandings" had occurred and that the I.A.T.A.'s views should be taken as those in its earlier working paper. B.O.A.C. and B.E.A. specifically disassociated themselves from I.A.T.A.'s preference for VOR/DMET. Support for Decca was, however, forthcoming from Capt. Masland, the I.F.A.L.P.A. delegate, who contributed a lucid description of the difficulties of flying in the New York area. A particular point that he made was that no more VORs could be incorporated in the area because of frequency problems.

The next stage of the meeting should have been a comparative assessment of the two aids against the operational requirements put forward by committee A. This action was in fact proposed by the U.K. delegation but was opposed by the U.S. on the ground that adequate opportunity had been given for a study of the systems. A vote was taken and the U.K. was defeated. The U.K. then proposed an informal meeting of heads of delegations at which divergent views might be resolved. The meeting was held, but minds were made up and nothing was achieved.

At this point it was still possible for Decca and DMET to be recommended as dual standards; for DMET to be the standard and Decca the recommended practice, or vice versa; for DMET and Decca to be dual recommended practices; or for another conference to be called. But a compromise solution was not acceptable to the U.S. or to I.A.T.A., and a vote was taken on the U.S. proposal to make DMET a complementary standard to VOR until January 1, 1975. By 20 votes to 4 with 12 abstentions, the proposal was upheld.

As outlined previously in *Flight* (March 6), the decision has yet to be ratified by the I.C.A.O. council, although a precedent would be established were it not to do so. But whatever the council's decision, the area-coverage navigational aid with pictorial presentation will continue to be upheld as the best solution by the United Kingdom. The conference passed a recommendation that continued development of short-distance navigation aids should be encouraged; and Decca will undoubtedly exploit this to the full. And whether history proves the VOR/DMET decision to be right or wrong, it has been affirmed that the U.K. will continue to extend the use of the aid in which its trust is placed. A. T. P.

## FRONT-OFFICE CHANGES IN B.O.A.C.

B.O.A.C. have lately announced changes in senior appointments. Following a recent illness, Capt. M. N. M. Weir has asked to be relieved of his post as chief of flight operations, which he has held for nearly three years. He is now to become regional representative, South-West Pacific, and will be based in Sydney; he will succeed Mr. P. D. Hood, who is being posted to Europe as B.O.A.C.'s special European representative. The post of chief of flight operations will be taken over, with immediate effect, by Capt. T. H. Farnsworth, at present deputy chief of flight operations. Capt. Farnsworth, who was the first B.O.A.C. pilot to log 50 hr on Comets, served in flying-boats on the Empire routes for seven years, and was later engaged on aircraft development work in B.O.A.C. as well as serving with the Britannia Flight.

Mr. H. Spear is relinquishing his post as chief personnel officer with effect from April 30, when the personnel and medical branches of B.O.A.C. will be combined in a single department under Dr. K. G. Bergin, at present chief medical officer. Dr. Bergin will be responsible to the managing director for "the whole field of human relations" within the Corporation. A report in the *News Chronicle* quotes Mr. Spear as saying of his resignation: "A change has been made which is not agreeable to me."

The Corporation has also announced that Mr. M. A. Snowball has been appointed assistant general manager, South America, on the staff of the general manager, western routes.

## SINGAPORE DECISION

THE implications of a reduction in K.L.M.'s traffic temporary rights at Singapore have already been discussed in a leading article in *Flight* (February 13, 1959). By the terms of the decision now made, K.L.M. will be permitted one flight a week originating from Singapore. Although statistics may show that this is a reasonable frequency in view of the volume of traffic to Amsterdam, strong resentment has been expressed by the Dutch at this final decision.

The reasons for the Government's decision are given in the following terms:—

"The U.K./Netherlands air services agreement does not provide for any Netherlands route terminating at Singapore. Such a route is both more valuable to K.L.M. and more commercially threatening to B.O.A.C. than a transit route through to Indonesia, since the whole capacity of the aircraft is available for traffic to or from Singapore: K.L.M. can thus compete directly with B.O.A.C. for Singapore/Europe traffic. Consequently the grant of a terminating route is in itself a concession to the Netherlands. We feel no obligation to allow the route to be used for excessive competition with our airlines; its use must be limited to the reasonable needs of Singapore/Netherlands traffic.

"The agreed figures show that Singapore/Netherlands traffic on K.L.M.'s service is now averaging 26 or 27 passengers per week in each direction. These passengers can be comfortably accommodated on one weekly service by a 63-seater aircraft, and the whole of any additional capacity is in direct competition with B.O.A.C. and their partners Qantas.

"The latest figures, as compared with those for the period before the Indonesian crisis show that (contrary to the world traffic trend) B.O.A.C. and Qantas traffic to and from Singapore has actually fallen off. As for their traffic at Djakarta, they have not increased their services through this point and their traffic has increased only very slightly (less than one passenger per flight), whereas other international airlines have increased their services or have started up new ones and are obviously benefiting from K.L.M.'s exclusion from Indonesia.

"We cannot agree that a single weekly service between the Netherlands and Singapore is commercially impossible for K.L.M. It is clear from the traffic figures that the determining commercial factor for K.L.M. is the traffic to and from intermediate points rather than at Singapore; and a frequent service to these would be provided by K.L.M.'s network of Far Eastern routes irrespective of the number of services K.L.M. operate to Singapore.

"In spite of the fact that K.L.M. and B.O.A.C. are strong competitors, we have given K.L.M. generous treatment over British traffic rights. They have very valuable rights through Prestwick for Transatlantic traffic which are not balanced by any compensating rights for British airlines in Dutch territory. K.L.M.'s existing rights *through* Singapore to Indonesia remain in the air services agreement to be taken up (instead of the temporary terminating rights) as soon as conditions permit and the airline wishes to do so."

## CHANNEL AIR FERRIES (Continued from page 425)

his journey by car. Not a great deal of brochuremanship is practised by the air ferries, but here there does seem to be scope for an adroit advertising campaign underlining not only the possibility, but also the attractiveness, of motoring abroad for a winter holiday. Cross-Channel operational regularity, even in the worst months of winter, has been shown to be quite good; Silver City's limits at Ferryfield are 1,000 yd visibility and 300ft cloudbase. And although winter sports traffic does not compare in volume with summer holiday traffic the winter holiday vogue does seem to be gaining ground. It could be further encouraged.

This article has set out to investigate an airline problem that is nowhere more acute than on the short sea crossings of the English Channel. In spite of a diversity of winter operations and special measures adopted to deal with the volume of summer traffic, travellers on business—whose travel times are inflexible and who can give only short notice of their intention of travelling on a certain day—cannot utilize the air ferries to the extent they would like, particularly at summer weekends. Holiday travellers must book very early in the year to be certain of securing accommodation for themselves and their cars on the day that they wish to travel. Thus the public service that the airlines would like to give cannot always be offered. Some palliatives have been suggested here; but even where they can be put into effect, realization of an even flow of traffic will not come about overnight. In particular, building up winter freight business is (in the words of one air ferry) "a long, hard grind," and the enlightened fare policy that makes the Channel air ferries so popular has hindered rather than helped to ease the seasonal problem. As with most successful enterprises, there is room for improvement; but to see this in perspective it ought also to be remembered that only eleven years ago there were those who were prepared to laugh the fledgling air ferry to scorn.

### CONCLUSIONS

- *Lower fares on the air ferries have increased the demand to a point where bookings must be made considerably in advance of the flight. This has called into doubt the efficiency of the two air ferries in providing a public service.*
- *Efforts to reduce the extremely seasonal nature of the traffic by differential pricing have only been partly successful, and have been offset by the attraction of a lower overall level of fares.*
- *Additional competition could probably not be introduced without economic penalties to all airlines.*
- *Aircraft and crews might possibly be chartered from foreign carriers.*
- *Reciprocal services with another airline or the operation of a similar service in the Southern Hemisphere—if it can be found—offer an opportunity for establishing an opposing winter traffic peak.*
- *A Channel tunnel for motor traffic could reduce the airlines' summer traffic peaks; a train tunnel only would be less successful.*
- *Considerable energy has been devoted to increasing winter traffic; winter-holidaymakers might profitably be encouraged to travel by car.*

*Right, Mme. Elena Faggionato de Frondizi, wife of the Argentine President, unveils the name of Aerolineas Argentina's first Comet 4—"Las Tres Marias"—at Ezeiza Airport, B.A., on March 7. The airline's president, Cmdt. Juan Jose Guiraldes, is on the right. The second Comet 4 was due to arrive there on March 22, having given demonstrations at Paris, Frankfurt, Amsterdam, Rome, Madrid and Lisbon during the preceding three days. Left, the 43-seat tourist cabin, with seats by Aircraft Service Inc. Décor, by Charles Butler, is in red, blue and gold*

## AIR COMMERCE . . .

*Left, newly appointed managing director of Pakistan International is A. Cdre. Malik Nur Khan, a senior P.A.F. officer with a "distinguished experience of flying, command and staff duties"*

*Right, scene at the 14th I.F.A.L.P.A. annual meeting, held this year at Helsinki, from March 10-17. Addressing the pilots is Mr. Clarence Sayen (U.S.A.), president of the Association*

# BREVITIES

A Ghana Airways Stratocruiser lost a propeller 25 minutes after take-off from Accra on March 18. The aircraft turned back and the engine is reported to have caught fire after the airliner landed. There were no casualties.

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The publicity manager of Aer Lingus, Mr. G. C. Draper, is to join Central African Airways on June 1 as traffic and sales manager. He will work closely with Mr. Max Stuart-Shaw, formerly assistant general manager of Aer Lingus and now general manager of C.A.A.

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Earlier reports that the East German BB.152 jet airliner had crashed on March 4 (see *Flight* last week and p. 426 of this issue) were some time later confirmed by the East German government. The crew of four were killed in the course of a test flight near Dresden in bad weather; no other details are available.

* * *

Bristol are reported to be discussing with "big freight airlines in America" a new cargo version of the Britannia with a tail ramp large enough for the loading of vehicles. It is suggested that M.A.T.S., whose future in relation to the civil airlines is at present under Senate investigation, might purchase a number which could be not less than 50.

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The Bulgarian Government has admitted before the International Court of Justice that its anti-aircraft artillery acted with "undue haste" in shooting down an El Al Constellation on July 27, 1955. The 51 passengers and crew of seven were killed. The French lawyer representing Bulgaria, Professor Pierre Cot, said that compensation would be paid.

* * *

In the opening stages of the public inquiry into the Independent Air Travel Viking accident last September, the Solicitor-General, Sir Harry Hylton-Foster, submitted that the aircraft was overloaded at take-off; that there was a possibility that aircrew flight-time limitations had been exceeded; and that neither of the two men who did maintenance work on the engine prior to the flight was licensed, these matters being in breach of regulations.

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Capt. M. Kozubski, managing director of Independent Air Travel, which is at present involved in a public inquiry into the Viking crash at Southall (see above), has sold his majority shareholding in the company. He proposes to form another independent company, to be known as Falcon Airways. Capt. Kozubski has said: "My departure from Independent has nothing whatsoever to do with the accident."

American Airlines' Boeing 707 load factor for the first five weeks of operation was 96.2 per cent.

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B.E.A.'s freight traffic last year increased by 18 per cent over that carried in 1957. Of the total 26,500 tons, 64.3 per cent was carried in the holds of scheduled aircraft on passenger services.

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In future all reports of near-misses in America will be forwarded to a newly formed F.A.A. near-miss "clearing house." The new establishment is known as the Central Reporting Office, and it will be devoted entirely to the speedy investigation of reports.

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Swissair announced last week a proposed increase in share capital from 63 to 105m Swiss francs, to be made at the annual general meeting on April 9. Net profit in 1958 amounted to more than Fr. 5.1m, and a dividend of 6 per cent—the same as in 1957—is to be recommended.

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Alitalia's four Douglas DC-8s are due for delivery in February 1960, and for service in April 1960. Previously the delivery date was given as summer 1960. J.A.L. announce that the first of their four DC-8s will be delivered in May 1960; the date previously announced was September 1960.

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Los Angeles Airways have bought two 10-passenger S-62 helicopters (G.E. T58 gas turbine). Delivery is to start early in 1960. The type has a F.A.A. airworthiness certificate. The airline is negotiating to purchase the twin-engined S-61, a 25-passenger turbine helicopter expected to be available early in 1961.

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According to evidence given at the recent inquest into the crash of Hunting-Clan Viscount G-ANRR in Surrey last December, certain parts of the elevator spring tab mechanism had been incorrectly assembled during a major check. Verdicts of accidental death were returned on the five crew-members who lost their lives.

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According to the latest issue of *B.O.A.C. News*, the Corporation's associated companies are likely to make "very heavy" losses in the 1958-59 year. Those chiefly concerned may be Middle East Airlines, B.W.I.A., Kuwait Airways, and Bahamas Airways. B.O.A.C.'s total investments in associates is about £15m, of which £2¼m is in shares, £5m in debentures and interest-bearing loans, and the balance representing aircraft and equipment supplied on hire or hire-purchase.

## WESTLAND'S LONDON HELIPORT (Continued from page 440)

heliport will undoubtedly assist the general development of the helicopter for civil uses by providing a much needed operational facility. By this means factual evidence will be forthcoming to prove the case for the establishment of other heliports in London, and of course in other cities.

With an overall cost in the region of £60,000, and a contemplated life based on a lease agreement of seven years only, it is clear that no profit is to be expected. Running costs are likely to be high, but despite this it is intended that the heliport shall as far as possible be made to operate on a commercially economic basis.

Revenue will be derived from landing and parking fees, the sale of fuel and so forth. Initially the scale of landing charges will be similar to that for an aeroplane at a Government-controlled airport. This rate is based on an aircraft's gross certificated weight, and approximates to seven shillings for each 1,000 lb. Factual evidence as to what extent the heliport will generate helicopter traffic flow will obviously not become available until it is opened. Even so, it will take a few months to establish a utilization pattern, days and hours of highest frequency, and so on. There seems little doubt that the existence of the heliport will stimulate the interest of business houses in helicopter use, and generate new charter and possibly scheduled operation activities.

It is not until a site such as the Westland Heliport has become a firm project that a true appreciation can be gained of the many problems of detail which have to be resolved or of the number of people representing various interests who have to be drawn into consultation. Official hesitancy in readily agreeing to standards for a "first-off" project is not conducive to speedy decision.

For such reasons it would have been an unusual achievement had the planning and timing of the programme, and estimates of cost, strictly conformed to the originally determined pattern. Construction of the heliport will thus have taken 8½ months up to the time for official opening towards the end of next month.

# SERVICE AVIATION

*Royal Air Forces and Naval Flying News*

*D.H. Sea Vixens and a Supermarine Scimitar on board H.M.S. "Centaur" during the recent intensive flying trials carried out by these aircraft (referred to on this page in last week's issue)*

### Gannets to Whirlwinds

ONE of the two remaining squadrons at R.N.A.S. Eglinton, No. 719 (equipped with Gannets), was disbanded on March 17. The other squadron, No. 815 (Whirlwind HAS.7s), is leaving after Easter and next month the station's white ensign is being laid up in the parish church. The remaining personnel at Eglinton will pack up stores ready for the final closure in September. No. 719 Squadron is being re-formed at Portland as No. 737 with Whirlwinds. (In his explanatory statement on the Navy Estimates the First Lord of the Admiralty referred to "a number of front-line squadrons of Whirlwinds" which have been formed for the anti-submarine rôle.)

### Trainer Trials

A SIX-MONTHS' trial is to be given by the R.A.A.F. to a Hunting Jet Provost at No. 1 Basic Flying Training School, Point Cook, Victoria. The aircraft is being sent to Australia by sea and will be assembled by the de Havilland Aircraft Pty. Ltd. at Bankstown near Sydney. An instructor from No. 1 F.T.S. will then convert to it at Bankstown before flying the Jet Provost to Point Cook, where two selected trainee pilots are to be taught to fly in it. This will be the first time in R.A.A.F. history that student pilots have started their primary training on a pure jet aircraft; at present they begin on Winjeels.

During the trial period at Point Cook the other members of No. 35 Pilot Training Course (from which the two Provost-trainees are being selected) will fly Winjeels, and comparative progress will be closely watched. After completing 116 hr flying the members of No. 35 Course go from Point Cook to Pearce, W.A., for conversion to Vampires.

The first aircraft of the evaluation batch of 14 Folland Gnat Trainers ordered for the R.A.F. is to fly this year, and the second will follow close behind. Detailed preparations for the construction of the first nine aircraft have been completed. The Gnat Trainer will be transonic (Mach .95 in level flight) but will be able to operate from existing F.T.S. airfields.

### Eggheads in Bonedomes

MINIMUM educational qualifications for R.A.A.F. aircrew have been raised, and candidates must now have standards equivalent to those required for University entrance. The Minister for Air, Mr. F. M. Osborne, said that this was necessary because of the increasing complexity of modern aircraft and the technical knowledge needed for guided weapons.

### Retaining the Number

ANOTHER chapter in the long history of No. 208 Sqn. is being written next Wednesday. On that day the squadron is being disbanded at R.A.F. Nicosia; but its 40-year-old association with the Middle East will not be broken, for from April 1 its number will be taken over by a Venom squadron at Aden which was formed recently and has temporarily held the number 142. After the disbandment ceremony at Nicosia, when the Hunter F.6s of No. 208 Sqn. will fly past the Commander-in-Chief M.E.A.F. (Air Marshal Sir William MacDonald), the squadron Standard is being flown to Aden. It will be taken there in the care of the squadron commander (S/L. J. H. Granville-White) and an escort party, and at Khormaksar is to be handed over to No. 142 Sqn. (S/L. R. Ramirez), which will then become No. 208 Sqn.

The original No. 208 Sqn. was formed in 1916 as No. 8 Sqn., Royal Naval Air Service. It became 208 on the formation of the R.A.F. in 1918, but to old members is still known as "Naval Eight" (a commemorative article was published in *Flight* for April 4 last year, marking the 40th anniversary of the R.A.F. and the squadron's re-equipment with Hunter F.6s). At Aden, the new 208 will operate side by side with No. 8 Sqn., this being the first time that "Naval Eight" and No. 8 (which originated in the Royal Flying Corps) have shared the same base.

It was announced recently by the Secretary of State for Air, in his memorandum accompanying the 1959-60 Air Estimates, that Venoms in the Arabian Peninsula were to be replaced by Hunters.

*Rear Admiral A. S. Bolt, Deputy Controller (Military Aircraft), Ministry of Supply, in the gyro test laboratory during his recent visit to Avro's Weapons Research Division at Woodford. With him are (left to right) Mr. R. H. Francis, chief engineer of the division; Mr. S. Bowie, on the division staff; and Mr. A. Sewart, assistant general manager (missiles)*

### Getting a Ride

THREE R.A.A.F. Avon-Sabres were recently flown from Richmond, N.S.W., to Butterworth in Malaya as cargo in the holds of three of the R.A.A.F.'s recently acquired C-130 Hercules transports. The journey of 3,800 miles took 12 hr flying time, with only one stop, compared with 6,040 miles and five stops—but only 11½ hr flying time—when the Sabres were ferried out in "Operation Sabre Ferry" via New Guinea and the Philippines. The airlifted Sabres are to be used as spares for Nos. 3 and 77 Squadrons which are based at Butterworth.

### Honour for Colerne

FREEDOM of entry to the city of Bath is to be conferred on R.A.F. Colerne on April 4 by the city council in recognition of the close and happy associations which have existed between Bath and the station. At a ceremony in the Royal Crescent the mayor (Cllr. H. Roberts) will present a scroll to G/C. E. G. Watkins, who commands Colerne; there is to be a march-

*Air Chief Marshal Sir Walter L. Dawson, Air Member for Supply and Organization, presenting the Casson Cup—awarded to the best all-rounder on the squadron—to Acting P/O. J. H. Piercy at the recent annual dinner of Leeds University Air Squadron*

## SERVICE AVIATION . . .

past with fixed bayonets (a privilege granted by the freedom charter) and a fly-past by nine Hastings aircraft of Transport Command.

Colerne has been a Transport Command base since January 1957, its first aircraft being those of No. 24 (Commonwealth) Sqn., followed by those of No. 511 (now 36) Sqn. It is also the home of No. 49 M.U., which since 1946 has carried out special modification and re-equipment work on aircraft of both Bomber and Transport Commands.

### R.C.N. Helicopter Expert

A PIONEER in the use of helicopters by the Royal Canadian Navy, whose first helicopter flight he commanded, Cdr. John D. Lowe assumed a new appointment early this month when he became captain of the destroyer escort H.M.C.S. *Sioux*.

He qualified as a pilot with the Royal Navy after having served at sea during the war in the North Atlantic and English Channel, then flew with No. 825 Sqn. from H.M.C.S. *Warrior*, Canada's first aircraft carrier. In March 1951 he went to the U.S. Naval Air Station at Pensacola, Florida, for helicopter training and it was on his return to Canada after this course that he commanded the first R.C.N. helicopter flight. Among his recent appointments have been those of Deputy Director of Naval Aviation (1956) and Commander (Air) at H.M.C.S. *Shearwater* (1957).

### Over the Beat

SINCE the Mau-Mau emergency the Kenya Police Air Wing has continued to do sterling work under different, though still sometimes difficult, conditions. Its aircraft strength has been reduced from 15 (a mixture of Tri-Pacers and Cessna 180s) to eight, all of them Cessna 180s, one of which is seen in the illustration on this page. With headquarters at Wilson Airport (Nairobi West), and another base at Nyeri, the Wing is commanded by W/C. A. N. Francombe and has eight other pilots. The rest of its personnel consists of a staff officer, radio operator and secretary; and the organization manages to achieve about 750,000 passenger-miles a year, yet its annual cost to the Kenya Government is only about £37,000. Much of the wing's activity is concerned with police communications all over Kenya; but it also transports Government servants and the Governor and G.O.C. often use the Cessnas for their travels about the country. The aircraft are also employed for casualty evacuation in remote areas, for supply-dropping, and in the campaign against highly organized game-poaching in the Reserved areas. This last rôle necessitates good air-to-ground radio communication, which exists through a very efficient V.H.F. set-up (derived from the emergency) whereby every police station has its own link with headquarters in Nairobi. A police pilot is always within call of two or three stations and the repeater system is so complete that W/C. Francombe can sit at his desk at Wilson Airport and talk to any of his pilots up to 200 miles away.

### R.A.F. Postings

AMONG Royal Air Force appointments recently announced by Air Ministry are the following:—

**Transport Command:** W/C. H. S. Maurice-Jones to H.Q. for administrative staff duties, March 16.

**Flying Training Command:** Wing Commanders V. E. M. Harding to H.Q. for administrative staff duties, March 16; and A. J. D. Maclachlan to the R.A.F. College, Cranwell, as Deputy President of the R.A.F. Selection Board, March 16.

**Technical Training Command:** G/C. A. W. Caswell to No. 2 School of Technical Training, Cosford, Salop, to command, March 16; Wing Commanders G. J. Spence to H.Q. for administrative staff duties, March 16, and G. A. H. Wright to the Radio Engineering Unit, R.A.F. Henlow, Beds, as Senior Technical Officer, March 16.

**Miscellaneous:** W/C. P. G. K. Williamson to H.Q. Allied Forces Southern Europe, for organization and training duties, March 16.

### Ambala Reunion

A REUNION of No. 1 S.F.T.S. (1) Ambala will be held at the Chevrons Club, 3 Dorset Square, London, N.W.1, on Saturday, April 4. This is the twelfth to be organized, and details may be obtained from Stan Booth, 28 Dene Road, New Southgate, London, N.11.

### IN BRIEF

First deliveries of Sidewinder for the R.A.A.F. were made early this month. They are to be fitted to Sabres of Nos. 3 and 77 Squadrons in Malaya.

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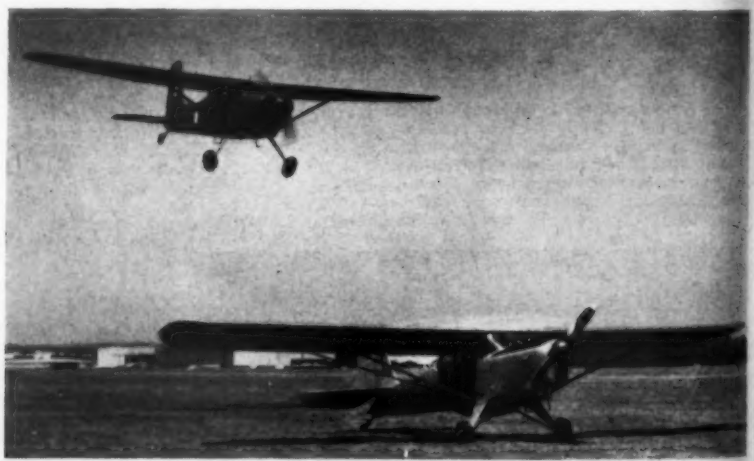
The R.A.F. won the Services' cross-country championship for the eighth successive year, and for the eighteenth time, at Henlow on March 13. They scored 31 points (having five in the first seven men home) against 49 by the Army and 107 by the Royal Navy.



*Light aircraft on active service in three different parts of the world are (at right) the first of eight Cessna 180s ordered by the R.A.A.F. from the United States for the A.O.P. Flight at Canberra taking to the air at Bankstown Aerodrome, near Sydney, for final flight tests; below left, an Auster 9 of No. 656 Light Aircraft Sqn., A.A.C. (whose work was described on this page, March 6), dropping supplies in Malaya; and a Cessna 180 of the Kenya Police Air Wing, which is referred to in a news-item above, seen (below right) in its hangar at Wilson Airport, Nairobi*

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